The Enclosed Document Is Provided For Your Convenience.

Please Email ALL Questions:

MailTo:ContractAdministration@TampaGov.net

Please Let Us Know If You Plan To Bid

City of Tampa
Contract Administration Department
306 E. Jackson St. #280A4N
Tampa, FL 33602
(813)274-8456

CITY OF
TAMPA, FLORIDA

NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS
PROPOSAL, BID BOND, FORM OF NOTICE OF AWARD,
AGREEMENT, PERFORMANCE BOND AND
SPECIFICATIONS

FOR

Contract 17-C-00037

Fire Station 23 Improvements

City of Tampa
CONTRACT ADMINISTRATION DEPARTMENT
TAMPA MUNICIPAL OFFICE BUILDING
306 E. JACKSON STREET - 4TH FLOOR NORTH
TAMPA, FLORIDA 33602

AUGUST 2017

Revised 2016-08-29

CITY OF TAMPA
CONTRACT ADMINISTRATION DEPARTMENT
306 E. Jackson Street 280A4N
Tampa, FL 33602

****

BID NOTICE MEMO

****

Bids will be received no later than 1:30 p.m. on the indicated Date(s) for the following Project(s):

****

CONTRACT NO.: 17-C-00037; Fire Station 23 Improvements

BID DATE: August 29, 2017 ESTIMATE: $2,650,000 SCOPE: The project comprises construction of a new 10,011 sf facility which includes site work with parking lot apron, landscaping and irrigation utilizing Florida friendly materials, masonry exterior walls, pre-fabricated trusses, metal roofing, cement plaster and thin stone finishes, HVAC including chiller with system, plumbing, electrical which includes minor photovoltaics, interior finishes, with all associated work required for a complete project in accordance with the Contract Documents. PRE-BID CONFERENCE: Tuesday, August 15, 2017, 2:00 p.m.
Attendance is not mandatory, but recommended.

****

Bids will be opened in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida 33602. Pre-Bid Conference is held at the same location unless otherwise indicated. Plans and Specifications and Addenda for this work may be examined at, and downloaded from, www.demandstar.com. Backup files are available at http://www.tampagov.net/contract-administration/programs/construction-project-bidding. Subcontracting opportunities may exist for City certified Women/Minority Business Enterprises (W/MBEs) or Small Local Business Enterprises (SLBEs). A copy of the current directory may be obtained at www.Tampagov.net. Phone (813) 274-8456 for assistance. Email Questions to: contractadministration@tampagov.net .

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NOTICE TO BIDDERS
CITY OF TAMPA, FLORIDA

Contract 17-C-00037; Fire Station 23 Improvements

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., August 29, 2017, in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida, there to be publicly opened and read aloud.

The proposed work is to include, but not be limited to, construction of a new 10,011 sf facility which includes site work with parking lot apron, landscaping and irrigation utilizing Florida friendly materials, masonry exterior walls, pre-fabricated trusses, metal roofing, cement plaster and thin stone finishes, HVAC including chiller with vav system, plumbing, electrical which includes minor photovoltaics, interior finishes, with all associated work required for a complete project in accordance with the Contract Documents.

The Instructions to Bidders, Proposal, Form of Bid Bond, Agreement, Form of Public Construction Bond, Specifications, Plans and other Contract Documents are posted at DemandStar.com. Backup files may be downloaded from http://www.tampagov.net/contract-administration/programs/construction-project-bidding. One set may be available for reference at the office of the Contract Administration Department, Municipal Office Building, Fourth Floor North, City Hall Plaza, Tampa, Florida 33602.

Each Proposal must be submitted on the Proposal form included in the Specifications and must be accompanied by a certified check or cashier's check on a solvent bank or trust company in compliance with Section 255.051, Florida Statutes, made payable to the City of Tampa, in an amount of not less than five per cent of the total bid, or a Bid Bond, of like amount, on the form set forth in the Contract Documents, as a guarantee that, if the Proposal is accepted, the Bidder will execute the Proposed Contract and furnish a Public Construction Bond within twenty (20) days after receipt of Notice of Award of Contract.

To be eligible to submit a proposal, a Bidder must hold the required and/or appropriate current license, certificate, or registration (e.g. DBPR license/certificate of authorization, etc.) in good standing at the time of receipt of Bids. Per Section 489.131, Florida Statutes, Proposals submitted for the construction, improvement, remodeling, or repair of public projects must be accompanied by evidence that the Bidder holds the required and/or appropriate current certificate or registration, unless the work to be performed is exempt under Section 489.103, Florida Statutes.

The City of Tampa reserves the right to reject any or all Bids and to waive any informalities in the Bid and/or Bid Bond. Acceptance or rejection of Proposals will be made as soon as practicable after the Proposals are received, but the City reserves the right to hold Proposals for ninety (90) days from the date of Opening.

Bid Protest Procedures: Unless subsequently indicated otherwise, in a revised posting on the Department's web page for Construction Project Bidding, the City of Tampa intends to award the referenced project to the lowest bidder listed in the tabulation posted on or about the date of Bid Opening. A bidder aggrieved by this decision may file a protest not later than 4:30 P.M., five (5) business days from the first posting thereof, pursuant to City of Tampa Code Chapter 2, Article V, Division 3, Section 2-282, Procurement Protest Procedures. Protests not conforming therewith shall not be reviewed.

Any Requests For Information must be submitted by email to ContractAdministration@tampagov.net

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list." Refer to Section 287.133, Florida Statues.

In accordance with the City of Tampa's Equal Business Opportunity Program Ordinance, a Goal may have been established for subcontracting with Small Local Business Enterprises (SLBEs) and Women-Minority Business Enterprises (WMBEs) certified by the City. Links to further information and a list of WMBEs and SLBEs are on the Department's Construction Project Bidding Web page. A link to the current complete directory of certified firms is on the Minority and Small Business Development Website.

Pursuant to Section 287.087, Florida Statutes, under certain circumstances preference may be given to businesses with a drug-free workplace program that meets the requirements of said Section.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.01 GENERAL:

The proposed work is the Fire Station 23 Improvements in the City of Tampa, as required for a complete project, as shown on the plans and detailed in the specifications. The work is located on land owned or controlled by the City of Tampa.

To be eligible to submit a proposal, a Bidder must hold the required and/or appropriate current license, certificate, or registration (e.g. DBPR license/certificate of authorization, etc.) in good standing at the time of receipt of Bids. Per Section 489.131, Florida Statutes, Proposals submitted for the construction, improvement, remodeling, or repair of public projects must be accompanied by evidence that the Bidder holds the required and/or appropriate current certificate or registration, unless the work to be performed is exempt under Section 489.103, Florida Statutes.

I-1.02 FORM PREPARATION AND PRESENTATION OF PROPOSALS: Replace the second sentence with the following: Submission of the entire specification book is not required.

I-1.03 ADDENDA – Section I-2.03 is replaced with the following: No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the City of Tampa, Contract Administration Department, 306 E. Jackson St., 4th Floor, Tampa, Florida 33602 and then emailed to ContractAdministration@tampagov.net. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be posted on DemandStar.Com and on the Department's web page, with notice given to all prospective bidders at the respective fax numbers or e-mail addresses furnished, for such purposes. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-1.04 INSTRUCTIONS TO BIDDERS

SECTION 2 – GENERAL INSTRUCTIONS. Section I-2.07 SIGNATURE AND QUALIFICATIONS OF BIDDERS is replaced with the following:

> Proposals must be signed in ink by the Bidder with signature in full. When firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more partners. When a corporation is a bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office
>
> If the bidder referred to in Section I-2.07 is a corporation, it must submit; upon request, a copy of its filed Articles of Incorporation. In addition, if the bidder was incorporated in another state, it must establish that it is authorized to do business in the State of Florida. If the bidder is using a fictitious name, it must submit upon request, proof of registration of such name with the Clerk of the Circuit Court of the County where its principal place of business is. Failure to submit what is required is grounds to reject the bid of that bidder.

SECTION 2 – GENERAL INSTRUCTIONS. Section I-2.14 NONDISCRIMINATION IN EMPLOYMENT is changed to add the following to the end of the existing text:

The following provisions are hereby incorporated into any contract executed by or on behalf of the City. Contractor shall comply with the following Statement of Assurance: During the performance of the Contract, the Contractor assures the City, that the Contractor is in compliance with Title VII of the 1964 Civil Rights Act, as amended, the Florida Civil Rights Act of 1992, and the City of Tampa Code of Ordinances, Chapter 12, in that Firm/Contractor does not on the grounds of race, color, national origin, religion, sex, sexual orientation, gender identity or expression, age, disability, familial status, or marital status, discriminate in any form or manner against said Firm's/Contractor's employees or applicants for employment. Contractor understands and agrees that the Contract is conditioned upon the veracity of this Statement of Assurance, and that violation of this condition shall be considered a material breach of the Award/Contract. Furthermore, Contractor herein assures the City that said Contractor will comply with Title VI of the Civil Rights Act of 1964 when federal grant(s) is/are

involved. This Statement of Assurance shall be interpreted to include Vietnam-Era Veterans and Disabled Veterans within its protective range of applicability. Firm/Contractor further acknowledges and agrees to provide the City with all information and documentation that may be requested by the City from time to time regarding the solicitation, selection, treatment and payment of subcontractors, suppliers and vendors in connection with this Award/Contract. Firm/Contractor further acknowledges that it must comply with City of Tampa Code of Ordinances, Chapter 26.5, as enacted by Ordinance No. 2008-89.

I-1.05 TIME FOR COMPLETION:

The work shall be arranged to be completed in accordance with a progress schedule approved by the Construction Engineer.

The time for completion of this project, referred in Article 4.01 of the Agreement, shall be 240 consecutive calendar days. The period for performance shall start from the date indicated in the Notice To Proceed.

I-1.06 LIQUIDATED DAMAGES:

The amount of liquidated damages, referred to in Article 4.06 of the Agreement, for completion of this project shall be $500 per calendar day.

I-1.07 BASIS OF AWARD OF CONTRACT:

The basis of award referred to in Item I-2.11 of Instructions to Bidders shall be the greatest amount of work, which can be accomplished within the funds available as budgeted. The award may be made on the basis of the total bid, base bid, alternates(s) if any, unit bids if any, or any combination thereof deemed to be in the best interest of the City.

Unless all bids are rejected, the award will be made within 90 days after opening proposals.

I-1.08 GROUND BREAKING CEREMONY:

Arrangement may be made by the City in coordination with the Contractor, for construction to commence with a Ground Breaking Ceremony. Details will be discussed at the pre-construction conference.

I-1.09 INSURANCE:

The insurance required for this project shall be as indicated on the attached and incorporated Special Instructions pages beginning with page INS-1 entitled CITY OF TAMPA INSURANCE REQUIREMENTS, which among other things requires the Contractor to provide a Certificate of Insurance to the City prior to commencing work. The City may from time to time use a third party vendor to manage its insurance certificates and related documentation which vendor may periodically initiate contact, requests for information, etc. on the City's behalf.

I-1.10 EQUAL BUSINESS OPPORTUNITY PROGRAM / WMBE-SLBE / REQUIREMENTS

BIDDERS MUST SUBMIT COMPLETED FORMS MBD-10 AND MBD-20 WITH BIDS. BIDS SUBMITTED WITHOUT THE COMPLETED FORMS (INCLUDING SIGNATURES) WILL BE DEEMED NON-RESPONSIVE.

In accordance with the City of Tampa's Equal Business Opportunity Program, a Goal of ___% has been established for subcontracting with Women-Minority Business Enterprises (WMBEs) and Small Local Business Enterprises (SLBEs) certified by the City. The goal is based upon the availability of firms.

BIDDERS MUST SOLICIT ALL FIRMS ON THE CONTACT LIST PROVIDED HEREIN, and provide documentation of emails, faxes, phone calls, letters, or other communication with the firms as a first step to demonstrate Good Faith Efforts to achieve the goal.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

GOOD FAITH EFFORT COMPLIANCE PLAN REQUIRED - When a Goal has been established, the Bidder must submit, with its bid, completed to the fullest extent possible, a Good Faith Effort Compliance Plan using the form GFECP contained herein. Additional documentation is required whenever a WMBE/SLBE subcontractor's low quote is not utilized. Supplemental information or documentation concerning the Bidder's Compliance Plan may be required prior to award as requested by the City.

DIVERSITY MANAGEMENT INITIATIVE, DMI, DATA REPORTING FORMS REQUIRED - Bidders must submit, with its bid, "DMI-Solicited" forms listing all subcontractors solicited and "DMI-Utilized" forms listing all subcontractors to be utilized. Supplemental forms, documentation, or information may be submitted at bid time or as requested by the City.

After an award, "DMI-Payments" forms are to be submitted with payment requests to report payments to subcontractors.

Bidders may visit the Minority Business Development web page at TampaGov.net for other information about the program, FAQ's, and the latest directory of certified firms.

I-1.11 BID SECURITY:

Surety companies shall have a rating of not less than B+ Class VI as evaluated in the most recently circulated Best KeyRating Guide Property/Casualty.

I-1.12 PUBLIC CONSTRUCTION BOND:

The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be issued and executed by (a) surety company(ies) acceptable to the City and licensed to underwrite contracts in the State of Florida. After execution of the Agreement and before commencing work, the Contractor must provide the City a certified copy of the officially recorded Bond.

I-1.13 AGREEMENT

SECTION 2 – POWERS OF THE CITY'S REPRESENTATIVES, new Article 2.05:

Add the following:

Article 2.05 CITY'S TERMINATION FOR CONVENIENCE:

The City may, at any time, terminate the Contract in whole or in part for the City's convenience and without cause. Termination by the City under this Article shall be by a notice of termination delivered to the Contractor, specify the extent of termination and the effective date.

Upon receipt of a notice of termination, the Contractor shall immediately, in accordance with instructions from the City, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

(a) cease operations as specified in the notice;
(b) place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete continued portions of the Contract;
(c) terminate all subcontracts and orders to the extent they relate to the Work terminated;
(d) proceed to complete the performance of Work not terminated; and
(e) take actions that may be necessary, or that the City may direct, for the protection and preservation of the terminated Work.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

The amount to be paid to the Contractor by the City because of the termination shall consist of:

(a) for costs related to work performed on the terminated portion of the Work prior to the effective date including termination costs relative to subcontracts that are properly chargeable to the terminated portion of the Work;

(b) the reasonable costs of settlement of the Work terminated, including accounting, legal, clerical and other expenses reasonable necessary for the preparation of termination settlement proposals and supporting data; additional costs of termination and settlement of subcontracts excluding amounts of such settlements; and storage, transportation, and other costs incurred which are reasonably necessary for the preservation, protection or disposition of the terminated Work; and

(c) a fair and reasonable profit on the completed Work unless the Contractor would have sustained a loss on the entire Contract had it been completed.

Allowance shall be made for payments previously made to the Contractor for the terminated portion of the Work, and claims which the City has against the Contractor under the Contract, and for the value of materials supplies, equipment or other items that are part of the costs of the Work to be disposed of by the Contractor.

SECTION 5 – SUBCONTRACTS AND ASSIGNMENTS, Article 5.01, Page A-7, last paragraph:
Change "…twenty-five (25) percent…" to "…fifty-one (51) percent…"

SECTION 8 – CONTRACTOR'S EMPLOYEES, Article 8.03, Page A-9, delete Article 8.03 in its entirety and Replace with the following new article:

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES
The Contractor shall, in the performance of the work required to be done under this Contract, employ all workers without discrimination and must not maintain, provide or permit facilities that are segregated.

SECTION 10 – PAYMENTS, Article 10.05, Page A-10, 1st Paragraph, 1st Sentence:
Change "…fair value of the work done, and may apply for…" to "…fair value of the work done, and shall apply for…"

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.02, Page A-12, 1st Paragraph, 2nd Sentence:
Delete the 2nd Sentence in its entirety and replace it with the following new 2nd Sentence:

Without limiting application of Article 11.07, below, whenever the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall indemnify, defend, and hold harmless the City Indemnified Parties (as defined below) from any and all Claims (as defined below) for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process, to be performed under the Contract and damages which may be incurred by reason of such infringement at any time during the prosecution or after completion of the work.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.03, Page A-12:
Delete Article 11.03 in its entirety and replace with the following new article:

ARTICLE 11.03 INTENTIONALLY OMITTED.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.07, Page A-12:
Delete Article 11.07 in its entirety and replace with the following new article:

ARTICLE 11.07 INDEMNIFICATION PROVISIONS
Whenever there appears in this Agreement, or in the other Contact Documents made a part hereof, an indemnification provision within the purview of Chapter 725.06, Laws of Florida, the monetary limitation on the extent of the indemnification under each such provision shall be One Million Dollars or a sum equal to the total Contract price, whichever shall be the greater.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

Contractor releases and agrees to defend, indemnify and hold harmless the City, its officers, elected and appointed officials, employees, and/or agents (collectively, "City Indemnified Parties") from and against any and all losses, liabilities, damages, penalties, settlements, judgments, charges, or costs (including without limitation attorneys' fees, professional fees, or other expenses) of every kind and character arising out of any and all claims, liens, is entitled to indemnification hereunder. This obligation shall in no way be limited in any nature whatsoever by any limitation on the amount or type of Contractor's insurance coverage.

The parties agree that to the extent the written terms of this indemnification are deemed by a court of competent jurisdiction to be in conflict with any provisions of Florida law, in particular Sections 725.06 and 725.08, Florida Statutes, the written terms of this indemnification shall be deemed by any court of competent jurisdiction to be modified in such a manner as to be in fully and complete compliance with all such laws and to contain such limiting conditions or limitations of liability, or to not contain any unenforceable or prohibited term or terms, such that this indemnification shall be enforceable in accordance with and to the maximum extent permitted by Florida law.

The obligation of Contractor under this Article is absolute and unconditional; it is not conditioned in any way on any attempt by a City Indemnified Party to collect from an insurer any amount under a liability insurance policy, and is not subject to any set-off, defense, deduction, or counterclaim that the Contactor might have against the City Indemnified Party. The duty to defend hereunder is independent and separate from the duty to indemnify, and the duty to defend exists regardless of any ultimate liability of Contractor, the City, and any City Indemnified Party. The duty to defend arises immediately upon presentation of a Claim by any party and written notice of such Claim being provided to Contractor. Contractor's defense and indemnity obligations hereunder will survive the expiration or earlier termination of this Contract.

Contractor agrees and recognizes that the City Indemnified Parties shall not be held liable or responsible for any Claims which may result from any actions or omissions of Contractor in which the City Indemnified Parties participated either through providing data or advice and/or review or concurrence of Contractor's actions. In reviewing, approving or rejecting any submissions by Contractor or other acts of Contractor, the City in no way assumes or shares any responsibility or liability of Contractor or any tier of subcontractor/subconsultant/supplier, under this Contract.

In the event the law is construed to require a specific consideration for such indemnification, the parties agree that the sum of Ten Dollars and 00/100 ($10.00), receipt of which is hereby acknowledged, is the specific consideration for such indemnification and the providing of such indemnification is deemed to be part of the specifications with respect to the services provided by Contractor.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.12, Page A-13:
Change Article 11.12 to add the following new language after existing text:

The City of Tampa is a public agency subject to Chapter 119, Florida Statutes. In accordance with Florida Statutes, 119.0701, Contractor agrees to comply with Florida's Public Records Law, including the following:

1. Contractor shall keep and maintain public records required by the City to perform the services under this Agreement;

2. Upon request by the City, provide the City with copies of the requested records, having redacted records in total on in part that are exempt from disclosure by law or allow the records to be inspected or copied within a reasonable time (with provision of a copy of such records to the City) on the same terms and conditions that the City would provide the records and at a cost that does not exceed that provided in Chapter 119, Florida Statutes, or as otherwise provided by law;

3. Ensure that records, in part or in total, that are exempt or that are confidential and exempt from disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and following completion (or earlier termination) of the Agreement if Contractor does not transfer the records to the City;

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

4. Upon completion (or earlier termination) of the Agreement, Contractor shall within 30 days after such event either transfer to the City, at no cost, all public records in possession of the Contractor or keep and maintain the public records in compliance with Chapter 119, Florida Statutes. If Contractor transfers all public records to the City upon completion (or earlier termination) of the Agreement, Contractor shall destroy any duplicate records that are exempt or confidential and exempt from public records disclosure requirements. If Contractor keeps and maintains public records upon completion (or earlier termination) of the Agreement, Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City in a format that is compatible with the information technology systems of the agency.

The failure of Contractor to comply with Chapter 119, Florida Statutes, and/or the provisions set forth in this Article shall be grounds for immediate unilateral termination of the Agreement by the City; the City shall also have the option to withhold compensation due Contractor until records are received as provided herein.

IF CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 813-274-8598, JIM.GREINER@TAMPAGOV.NET, AND CONTRACT ADMINISTRATION DEPARTMENT, TAMPA MUNICIPAL OFFICE BUILDING, 4TH FLOOR, 306 E. JACKSON ST. TAMPA, FLORIDA 33602.

I-1.14 Contractors must utilize the U.S. Department of Homeland Security's E-Verify Systems to verify the employment eligibility of all persons employed during the term of the Contract to perform employment duties within the State of Florida and all persons, including subcontractors, assigned by Contractor to perform work pursuant to the contract.

I-1.15 GENERAL PROVISIONS; G-2.02 Copies Furnished to Contractor: Replace the first paragraph with the following:

The Contractor shall acquire for its use copies of the plans and specifications as needed, which may be downloaded from the City's web site, at http://www.tampagov.net/contract-administration/programs/construction-project-bidding.

Bidder as part of the solicitation process (and as Contractor if Bidder is successful) may hold, come into possession of, and/or generate certain building plans, blueprints, schematic drawings, including draft, preliminary, and final formats, which depict the internal layout and structural elements of a building, facility, or other structure owned or operated by the City or an agency (singularly or collectively "Exempt Plans"), which pursuant to Section 119.071(3), Florida Statutes, are exempt from Section 119.07(1), Florida Statutes and Section 24(a), Art. I of the Florida State Constitution. Contractor certifies it has read and is familiar the exemptions and obligations of Section 119.071(3), Florida Statutes; further that Contractor is and shall remain in compliance with same, including without limitation maintaining the exempt status of such Exempt Plans, for so long as any Exempt Plans are held by or otherwise in its possession.

I-1.16 PAYMENT DISPUTE RESOLUTION

Any dispute pertaining to pay requests must be presented to the City pursuant to Executive Order 2003-1.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.17 SCRUTINIZED COMPANIES.

Section 287.135, Florida Statutes, prohibits agencies or local governmental entities from contracting with companies for goods or services of $1 million or more that are on either the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Section 215.473, Florida Statues, or is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statues, (effective October 1, 2016), or is engaged in a boycott of Israel (effective October 1, 2016), or is engaged in business operations in Cuba or Syria. A company that is on either the Scrutinized Companies with Activities in Sudan List or the

Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Section 215.473, Florida Statues, or is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statues, (effective October 1, 2016) or is engaged in a boycott of Israel (effective October 1, 2016) or is engaged in business operations in Cuba or Syria is ineligible to, and may not, bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of $1 million or more. Contractor certifies that it is not in violation of Section 287.135, Florida Statutes. For contracts $1,000,000 and greater, if the City determines the Contractor submitted a false certification under Section 287.135(5) of the Florida Statutes, or has been placed on the Scrutinized Companies with Activities in the Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statues, (effective October 1, 2016), or is engaged in a boycott of Israel (effective October 1, 2016), or been engaged in business operations in Cuba or Syria, the City shall either terminate the Agreement after it has given the Contractor notice and an opportunity to demonstrate the City's determination of false certification was in error pursuant to Section 287.135(5)(a) of the Florida Statutes, or maintain the Agreement if the conditions of Section 287.135(4) of the Florida Statutes are met.

I-1.18 FLORIDA'S PUBLIC RECORDS LAW; DATA COLLECTION

Pursuant to Section 119.071(5)(a)2a, Florida Statutes, social security numbers shall only be collected from Bidders and/or Contractor by the City should such number be needed for identification, verification, and/or tax reporting purposes. To the extent Bidder and/or Contractor collects an individual's social security number in the course of acting on behalf of the City pursuant to the terms and conditions of its Proposal or, if awarded, the Agreement, Bidder and/or Contractor shall follow the requirements of Florida's Public Records Law.

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SECTION 2
GENERAL INSTRUCTIONS

I-2.01 BIDDER'S RESPONSIBILITY

Before submitting Proposals, Bidders shall carefully examine the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and make all necessary investigations to inform themselves thoroughly as to the facilities necessary for delivering, placing and operating the necessary construction equipment, and for delivering and handling materials at the site, and inform themselves thoroughly as to all difficulties involved in the completion of all the work in accordance with the Contract Documents.

Bidders must examine the Plans, Specifications, and other Contract Documents and shall exercise their own judgment as to the nature and amount of the whole of the work to be done, and for the bid prices must assume all risk of variance, by whomsoever made, in any computation or statement of amounts or quantities necessary to complete the work in strict compliance with the Contract Documents.

Elevations of the ground are shown on the Plans and are believed to be reasonably correct, but are not guaranteed to be absolutely so and are presented only as an approximation. Bidders shall satisfy themselves as to the correctness of all elevations.

The City may have acquired, for its own use, certain information relating to the character of materials, earth formations, probable profiles of the ground, conditions below ground, and water surfaces to be encountered at the site of the proposed work. This information, if it exists, is on file at the offices of the Department of Public Works and Bidders will be permitted to see and examine this information for whatever value they consider it worth. However, this information is not guaranteed, and Bidders should satisfy themselves by making borings or test pits, or by such other methods as they may prefer, as to the character, location, and amounts of water, peat, clay, sand, quicksand, gravel, boulders, conglomerate, rock, gas or other material to be encountered or work to be performed.

Various underground and overhead structures and utilities are shown on the plans. The location and dimensions of such structures and utilities, where given, are believed to be reasonably correct, but do not purport to be absolutely so. These structures and utilities are plotted on the Plans for the information of the Bidders, but information so given is not to be construed as a representation or assurance that such structures will be found or encountered as plotted, or that such information is complete or accurate.

I-2.02 FORM, PREPARATION AND PRESENTATION OF PROPOSALS

Each Proposal shall be submitted upon the Proposal Form and in accordance with the instructions included herein. The Proposal Form must not be detached herefrom. All blank spaces for bid prices must be filled in, in both words and figures, with the unit or lump sum prices, or both, for which the Proposal is made. The computed total price for each unit price Contract Item shall be determined by multiplying the estimated quantity of the item, as set forth in the Proposal Form, by the corresponding unit price bid for such item. The resulting product shall be entered in the appropriate blank space under the column headed "Computed Total Price for Item". The lump sum price bid for each lump sum price Contract Item shall also be entered in the column headed "Computed Total Price for Item". If a Proposal contains any omissions, erasures, alterations, additions, or items not called for in the itemized Proposal, or contains irregularities of any kind, such may constitute sufficient cause for rejection of the Proposal. In case of any discrepancy in the unit price or amount bid for any item in the Proposal, the price as expressed in written words will govern. In no case is the Agreement Form to be filled out or signed by the Bidder.

In the case of certain jobs bid Lump Sum a "Schedule of Unit Prices" must be filled out as an attachment to the Lump Sum proposal. These prices may be used as a guide for the negotiation of change orders, at the City's option.

The proposal must be signed and certified and be presented on the prescribed form in a sealed envelope on/or before the time and at the place stated in the Notice of Bidders, endorsed with the name of the person, firm or corporation presenting it, the date of presentation, and the title of the work for which the Proposal is made.

Unless the apparent low bidder is now engaged in or has recently completed contract work for the City of Tampa, he, if requested, shall furnish to the City, after the opening of bids and prior to award, a summary statement of record of construction experience over the past three (3) years with proper supporting evidence, and, if required by the City, shall also furnish a list of equipment and other facilities pertinent to and available for the proper execution of the proposed work, and a statement of financial resources to the extent necessary to establish ability to carry on the proposed work. The City may make further investigations as considered necessary with respect to responsibility of the Bidder to whom it appears may be awarded the Contract.

If forwarded by mail, the sealed envelope containing the Proposal, endorsed as directed above, must be enclosed in another envelope addressed as specified in the Notice to Bidders and sent by registered mail.

I-2.03 ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the Contract Administration Department, Tampa Municipal Office Building, 4th Floor North, City Hall Plaza, Tampa, Florida 33602. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent by certified mail, with return receipt requested, to all prospective bidders at the respective addresses furnished, for such purposes, not later than three (3) working days prior to the date fixed for the opening of the Proposals, and if requested, a copy will be delivered to the prospective bidder's representative. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-2.04 BID SECURITY

Each Proposal must be accompanied by a certified or cashier's check issued by a solvent bank or trust company and payable at sight to the City of Tampa, in compliance with Section 255.051 Florida Statutes, or a Bid Bond upon the form provided herein, in an amount of not less than five percent of the sum of the computed total amount of the Bidder's Proposal as a guarantee that if the Proposal is accepted, the Bidder will execute and fill in the proposed Contract and Public Construction Bond within twenty (20) days after notice of award of the Contract. Certified checks shall have all necessary documentary revenue stamps attached if required by law. Surety on Bid Bonds shall be a duly authorized surety company authorized to do business in the State of Florida, and all such Bonds shall be issued or countersigned by a local resident producing agent, and satisfactory evidence of the authority of the person or persons executing such Bond to Execute the same shall be submitted with the Bond. Bid Bonds shall be issued by a surety company acceptable to the City.

Within ten (10) days after the opening of Proposals, the bid security of all but the three lowest Bidders will be returned. The bid security of the remaining two Bidders whose Proposals are not accepted will be

returned within ten (10) days after the execution of the Contract, or, if no such Contract has been executed, within ninety (90) days after the date of opening Proposals. The bid security of the Bidder whose Proposal is accepted will be returned only after he has duly executed the Contract and furnished the required Public Construction Bond and insurance.

Should it be necessary for the City to retain the bid security and said bid security is in the form of checks, the checks of these Bidders will be returned if replaced by Bid Bonds in an amount equal to the amount of the checks of such Bidders in such form and issued by a surety company acceptable to the City.

A Bidder may withdraw his Proposal before the time fixed for the opening of Proposals, without prejudice to himself, by communicating his purpose, in writing, to the Mayor and City Council, and when his communication is received, the Proposal will be handed to him or his authorized agent unopened. No Bidder may withdraw his Proposal within ninety (90) days after the day of opening Proposals.

The Bidder whose Proposal is accepted shall enter into a written contract, upon the Agreement form included herein, for the performance of the work and furnish the required Public Construction Bond within twenty (20) days after written notice by the City of Award of Contract has been served on such Bidder personally or after receipt of the written notice by registered mail to such Bidder at the address given in his Proposal.

If the Bidder to whom a Contract is awarded refuses or neglects to execute it or fails to furnish the required Public Construction Bond within twenty (20) days after receipt by him of the Notice of Award of Contract, the amount of his bid security shall be forfeited and shall be retained by the City as liquidated damages, and not as a penalty, it being now agreed that said sum is a fair estimate of the amount of damages that the City will sustain in case said Bidder fails to enter into a Contract and furnish the required Public Construction Bond. If a Bid Bond was furnished, the full amount of the Bond shall become due and payable as liquidated damages caused by such failure. The full amount of the bid security shall be forfeited as liquidated damages without consideration of the fact that an award may be less than the full amount of the Bidder's Proposal, excepting that the award shall be within the conditions of said Proposal relating to the basis of consideration for an award. No plea of mistake in the bid or misunderstanding of the conditions of forfeiture shall be available to the Bidder for the recovery of his deposit or as a defense to any action based upon the neglect or refusal to execute a contract.

I-2.05 LAWS AND REGULATIONS
The Bidder who is awarded the Contract must comply with all laws of the State of Florida, and all applicable Ordinances of the City of Tampa respecting labor and compensation and with all other statutes, ordinances, rules and regulations applicable and having the force of law.

I-2.06 PUBLIC CONSTRUCTION BOND
The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be executed by a surety company acceptable to the City of Tampa and licensed to underwrite contracts in the State of Florida. Surety companies shall have a rating of not less than: B+ Class VI as evaluated in the most recently circulated BEST'S KEY RATING GUIDE PROPERTY-LIABILITY.

I-2.07 SIGNATURE AND QUALIFICATIONS OF BIDDERS
Proposals must be signed in ink by the Bidder with signature in full. When a firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more of the partners. When a corporation is a Bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office. The Proposal shall also bear the seal of the corporation attested by its secretary. Anyone signing the Proposal as agent must file with it legal evidence of his authority to do so.

Bidders who are nonresident corporations shall furnish to the City a duly certified copy of their permit to transact business in the State of Florida, signed by the Secretary of State, within ten days of the notice to do so. Such notice will be given to Bidders who are nonresident corporations, to whom it appears an award will be made, and the copy of the permit must be filed with the City before the award will be made. Failure to promptly submit this evidence of qualification to do business in the State of Florida may be basis for rejection of the Proposal.

I-2.08 REJECTION OF PROPOSALS
The City reserves the right to reject any Proposal if investigation of the Bidder fails to satisfy the City that such Bidder is properly qualified to carry out the obligations and to complete the work contemplated therein. Any or all Proposals will be rejected if there is reason to believe that collusion exists among Bidders. Proposals will be considered irregular and may be rejected if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alternates, or irregularities of any kind. The City reserves the right to reject any or all Proposals and to waive such technical errors as may be deemed best for the interests of the City.

I-2.09 QUANTITIES ESTIMATED ONLY
The estimate of quantities of the various items of work and materials, if set forth in the Proposal Form, is approximate only and is given solely to be used as a uniform basis for the comparison of Proposals. The quantities actually required to complete the Contract work may be less or more than so estimated, and if awarded a Contract for the work specified, the Contractor agrees that he will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work assumed for comparison of Proposals and quantities of work actually performed. The City further reserves the right to vary the quantities in any amount.

I-2.10 COMPARISON OF PROPOSALS
Except jobs bid on a "One Lump Sum" basis, proposals will be compared on the basis of a total computed price arrived at by taking the sum of the estimated quantity of each time and the corresponding unit price of each item, and including any lump sum prices on individual items.

The computed total prices for individual Contract Items and the total computed price for the entire Contract, as entered by the Bidder in the Proposal Form, are for convenience only and are subject to correction in the tabulation and computation of the Proposals.

I-2.11 BASIS OF AWARD
The Contract will be awarded, if at all, to the lowest responsible Bidder or Bidders, as determined by the City and by the terms and conditions of the Contract Documents. Unless all bids are rejected, the award will be made within ninety (90) days after the opening of Proposals. The successful Bidder will be required to possess, or obtain, a valid City Occupational License.

I-2.12 INSURANCE REQUIRED
The successful Bidder and his subcontractors will be required to procure and pay for insurance covering the work in accordance with the provisions of Article 6.02 of the Agreement as indicated on special instructions pages beginning with INS-1.

I-2.13 NO ASSIGNMENT OF BID
No Bidder shall assign his bid or any rights thereunder.

I-2.14 NONDISCRIMINATION IN EMPLOYMENT
Contracts for work under this Proposal will obligate the contractors and subcontractors not to discriminate in employment practices.

Bidders must, if requested, submit with their initial bid a signed statement as to whether they have previously performed work subject to the President's Executive Order Nos. 11246 and 11375.
Bidders must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of the Contract.

Successful Bidders must, if requested, submit a list of all subcontractors who will perform work on the project and written,

signed statement from authorized agents of the labor pools with which they will or may deal for employees on the work together with supporting information to the effect that said labor pools practices and policies are in conformity with Executive Order No. 11246 and that said labor pools will affirmatively cooperate in or offer no hindrance to the recruitment, employment and equal treatment of employees seeking employment and performing work under the Contract, or a certification as to what efforts have been made to secure such statements when such agents or labor pools have failed or refused to furnish them prior to the award of the Contract.

I-2.15 LABOR STANDARDS
The Bidder's attention is directed to the Contract Provisions of the Labor Standards for federally assisted projects which may be attached to and made a part of the Agreement.

I-2.16 NOTICE TO LABOR UNIONS
If applicable, the successful Bidder will be required to provide Labor Unions and other organizations of workers a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers", and such form may be made a part of the Agreement.

I-2.17 NOTICE TO PROSPECTIVE FEDERALLY-ASSISTED CONSTRUCTION CONTRACTORS
A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted to said Secretary prior to the award of a federally-assisted construction and Contract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The form of certification may be bound herein following the form of Bid Bond.

Contractors receiving federally-assisted construction Contract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractor for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause:

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT
FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

"A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause."

"Contractors receiving subcontract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide from the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause."

The United States requires a pre-award conference if a proposed construction contract exceeds one million dollars to determine if the the prospective contractor is in compliance with the Equal Employment Opportunity requirements of Executive Order 11246 of September 24, 1965. In such instances, a meeting may be scheduled at which the prospective contractor must specify what affirmative action he has taken or proposed to take to assure equal employment opportunity which must be approved by the United States before award of the contract will be authorized.

Bidders must be prepared to submit an Equal Employment Opportunity (EEO) plan at a pre-award conference. The plan must include bidding opportunities offered by the Bidder to minority subcontractors.

On October 13, 1971, President Nixon issued Executive Order 11246 emphasizing the government's commitment to the promotion of minority business enterprise. Accordingly, the United States is firmly committed to the utilization of available resources to support this important program. U.S. agencies are most interested in realizing minority participation on the subject. Achieving equal employment opportunity compliance is required through Executive Order 11246. WE cannot emphasize too strongly that minority subcontractors be extended subcontractors bidding opportunities as but one step in your affirmative action policy.

Due to the importance of this contract, U.S. Agencies may conduct an EEO Conference prior to the award of the Contract. It is suggested that the responsive Bidder confirm the minority subcontractors he contacted for bids or quotations in his EEO plan submitted at the conference.

I-2.18 EEO AFFIRMATIVE ACTION REQUIREMENTS
By the submission of a Proposal, each Bidder acknowledges that he understands and will agree to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under any contract awarded pursuant to solicitation. Each Bidder agrees that if awarded a contract, he will similarly bind contractually each subcontractor. In policies, each Bidder further understands and agrees that if awarded a contract, he must engage in Affirmative Action directed to promoting and ensuring equal employment opportunity in the work force used under the contract (and he must require contractually the same effort of all subcontractors whose subcontracts exceed $100,000). The Bidder understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the project. * * * * * * * END of SECTION * * * * * * *

CITY OF TAMPA INSURANCE REQUIREMENTS

Prior to commencing any work or services or taking occupancy under that certain written agreement or award (for purposes of this document, Agreement) between the City of Tampa, Florida (City) and Firm/Awardee/Contractor/Consultant/Lessee/non-City party, etc. (for purposes of this document, Firm) to which this document is attached and incorporated as an Exhibit or otherwise, and continuing during the term of said Agreement (or longer if the Agreement and/or this document so requires), Firm shall provide, pay for, and maintain insurance against claims for injuries to persons (including death) or damages to property which may arise from or in connection with the performance of the Agreement (including without limitation occupancy and/or use of certain property/premises) by Firm, its agents, representatives, employees, suppliers, subtenants, or subcontractors (which term includes sub-consultants, as applicable) of any tier subject to the terms and conditions of this document. Firm's maintenance of insurance coverage as required herein is a material element of the Agreement and the failure to maintain or renew coverage or provide evidence of same (defined to include without limitation Firm's affirmative duty to provide from time to time upon City's request certificates of insurance, complete and certified copies of Firm's insurance policies, forms, and endorsements, information on the amount of claims payments or reserves chargeable to the aggregate amount of coverage(s) whether during the term of the Agreement or after as may be requested by the City in response to an issue or potential claim arising out of or related to the Agreement to which Firm's insurance obligations hereunder may apply or possibly help mitigate) may be treated as a material breach of the Agreement. Should at any time Firm not maintain the insurance coverages required, City at its sole option (but without any obligation or waiver of its rights) may (i) terminate the Agreement or (ii) purchase such coverages as City deems necessary to protect the itself (charging Firm for same) and at City's option suspending Firm's performance until such coverage is in place. If Firm does not reimburse City for such costs within 10 days after demand, in addition to any other rights, City shall also have the right to offset such costs from amounts due Firm under any agreement with the City. All provisions intended to survive or to be performed subsequent to the expiration or termination of the Agreement shall survive, including without limitation Firm's obligation to maintain or renew coverage, provide evidence of coverage and certified copies of policies, etc. upon City's request and/or in response to a potential claim, litigation, etc.

The City reserves the right from time to time to modify or waive any or all of these insurance requirements (or to reject policies) based on the specific nature of goods/services to be provided, nature of the risk, prior experience, insurer, coverage, financial condition, failure to operate legally, or other special circumstances. If Firm maintains broader coverage and/or higher limits than the minimums shown herein, the City requires and shall be entitled to such broader coverage and/or higher limits maintained by Firm. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the City. No representation is made that the minimum insurance requirements are sufficient to cover Firm's interests, liabilities, or obligations. Required insurance shall not limit Firm's liability.

Firm acknowledges and agrees Firm and not the City is the party in the best position to determine applicability (e.g. "IF APPLICABLE"), confirm, and/or verify its insurance coverage. Acceptance by the City, or by any of its employees, representatives, agents, etc. of certificates or other documentation of insurance or policies pursuant to the terms of this document and the Agreement evidencing insurance coverages and limits does not constitute approval or agreement that the insurance requirements have been met or that coverages or policies are in compliance. Furthermore, receipt, acceptance, and/or approval of certificates or other documentation of insurance or policies or copies of policies by the City, or by any of its employees, representatives, agents, etc., which indicate less coverage than required does not constitute a waiver of Firm's obligation to fulfill these insurance requirements.

MINIMUM SCOPE AND LIMIT OF INSURANCE [1]

A. Commercial General Liability (CGL) Insurance on the most current Insurance Services Office (ISO) Form CG 00 01 or its equivalent on an "occurrence" basis (Modified Occurrence or Claims Made forms are not acceptable without prior written consent of the City). Coverage must be provided to cover liability contemplated by the Agreement including without limitation premises and operations, independent contractors, contractual liability, products and completed operations, property damage, bodily, personal and advertising injury, contractual liability, explosion, collapse, underground coverages, personal injury liability, death, employees-as-insureds. Products and completed operations liability coverage maintained for at least 3 years after completion of work. Limits shall not be less than $1M per occurrence and $2M general aggregate for Agreements valued at $2M or less; if valued over $2M, a general aggregate limit that equals or exceeds the Agreement's value. If a general aggregate limit applies, it shall apply separately to the project/location (ISO CG 25 03 or 25 04 or equivalent). **(ALWAYS APPLICABLE)**

B. Automobile Liability (AL) Insurance in accordance with Florida law, as to the ownership, maintenance, and use of all owned, non-owned, leased, or hired vehicles. AL insurance shall not be less than: (a) $500,000 combined single limit each occurrence bodily injury and property damage for Agreements valued at $100,000 or less or (b) $1M combined single limit each occurrence bodily injury and property damage for Agreements valued over $100,000. If transportation of hazardous material involved, the MCS-90 endorsement (or equivalent). **(ALWAYS APPLICABLE)**

C. Worker's Compensation (WC) & Employer's Liability Insurance for all employees engaged under the Agreement, Worker's Compensation as required by Florida law. Employer's Liability with minimum limits of (a) $500,000 bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each employee for Agreements valued at $100,000 and under or (b) $1M bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each for all other Agreements. **(ALWAYS APPLICABLE)**

D. Excess (Umbrella) Liability Insurance for Agreements valued at $2M or more, at least $4M per occurrence in excess of underlying limits and no more restrictive than underlying coverage for all work performed by Firm. May also compensate for a deficiency in CGL, AL, or WC. **(ALWAYS APPLICABLE)**

E. Builder's Risk Insurance for property loss exposure associated with construction/renovation/additions to buildings or structures, including materials or fixtures to be incorporated. Must be "All Risk" form with limits of no less than the project's completed value, have no coinsurance penalties, eliminate the "occupancy clause", cover Firm (together with its contractors, subcontractors of every tier, and suppliers), and name City as a Loss Payee. **(IF APPLICABLE)**

F. Installation Floater coverage for property (usually highly valued equipment or materials such as compressors, generators, etc.) during its installation. Coverage must be "All Risk" including installation and transit for no less than 100% of the installed replacement cost value. **(IF APPLICABLE)**

G. Architects & Engineers Liability/ Professional Liability (E&O)/ Contractors Professional Liability (CPrL)/ Medical Malpractice Insurance where Agreement involves Florida-regulated professional services (e.g. architect, engineer, design-builder, CM, accountant, appraiser, investment banker medical professional) at any tier, whether employed or independent, vicarious design liability exposure (e.g. construction means & methods, design supervision), value engineering, constructability assessments/reviews, BIM process, and/or performance specifications. Limits of at least $1M per occurrence and $2M aggregate; deletion of design/ build liability exclusions, as applicable, and maintained for at least 3 years after completion of work/services and City's acceptance of same. **(IF APPLICABLE)**

H. Railroad Protective Liability (RPL) Insurance for construction within 50ft of operated railroad track(s) or where affects any railroad bridge, trestle, tunnel, track(s) roadbed, or over/under pass. Subject to involved rail road's approval prior to commencement of work. **(IF APPLICABLE).**

I. Pollution and/or Asbestos Legal Liability Insurance where Agreement involves asbestos and/or environmental hazards/contamination risks (defined broadly, e.g. lead, mold, bacteria, fuel storage, underground work, cleanup (owned or non-owned sites),pollutant generation/transportation, marine/natural resource damage, contamination claim, restitution, business interruption, mold, fungus, lead-based paint, 3rd party claims/removal, etc.), with limits of at least $1M per occurrence and $2M aggregate, maintained for at least 3 years after Agreement completion. **(IF APPLICABLE)**

J. Cyber Liability Insurance where Agreement involves portals allowing access to obtain, use, or store data; managed dedicated servers; cloud hosting services; software/hardware; programming; and/or other IT services

[1] "M" indicates million(s), for example $1M is $1,000,000

Document updated and approved by Legal and Risk Management as of 08/16/2016

and products are involved. Limits of not less than $2M per occurrence and $2M aggregate. Coverage sufficiently broad to respond to duties and obligations undertaken by Firm, and shall include, but not be limited to, claims involving infringement of intellectual property/copyright, trademark, trade dress, invasion of privacy violations, damage to or destruction of electronic information, information theft, release of confidential and/or private information, alteration of electronic information, extortion, virus transmission, and network security. Coverage, as applicable and with sufficient limits to respond, for breach response costs, regulatory fines and penalties, credit monitoring expenses. **(IF APPLICABLE)**

K. Drone/UAV Liability Insurance where Agreements involves unmanned aerial vehicles/drones. Coverage to include products and completed operations, property damage, bodily injury with limits no less than $1M per occurrence, and $2M aggregate; may be provided by CGL endorsement subject to City's prior written approval. **(IF APPLICABLE)**

L. Longshore & Harbor Workers' Compensation Act/Jones Act for work being conducted near, above, or on "navigable waters" for not less than the above Employer's Liability Insurance limit. **(IF APPLICABLE)**

M. Garagekeeper/Hangerkeeper/Marina Operator Legal Liability Insurance and/or Hull/P&I Insurance where parking lot, valet, dealership, garage services, towing, etc. and/or operation of a hangar, marina, or air plane/ship repairer, providing safe berth, air/watercraft storage/docking (on land/ in water), fueling, tours, charters, ferries, dredges, tugs, mooring, towing, boat/aircraft equipment/repair/alteration/maintenance, etc.; coverage against liability for damage to vehicles air/watercraft, their machinery in Firm's care, custody, or control both private & commercial. Limits at least equal to greater of $1M, value of max number of vehicles that may be in Firm's custody, or of most costly object in Firm's custody. **(IF APPLICABLE)**

N. Property Insurance and Interruption of Business (IOB) Insurance where premises, building, structure, or improved real property is leased, licensed, or otherwise occupied by Firm. Property Insurance against all risks of loss to any occupant/tenant improvements at full replacement cost with no coinsurance penalty, including fire, water, leak damage, and flood, as applicable, vandalism and malicious mischief endorsements. IOB by which minimum monthly rent will be paid to City for up to 1 year if premises are destroyed, rendered inaccessible or untenantable, including disruption of utilities, water, or telecommunications. **(IF APPLICABLE)**

O. Liquor Liability/Host Liquor Liability where Firm directly or indirectly provides alcoholic beverages, limits of at least $1M per occurrence and $1M aggregate. **(IF APPLICABLE)**

P. Educators Legal Liability Insurance where day care, after school program, recreational activities, etc. limits per G above. **(IF APPLICABLE)**

ADDITIONAL REQUIREMENTS

ACCEPTABILITY OF INSURERS - Insurance is to be placed with insurers admitted in the State of Florida and who have a current A.M. Best rating of no less than **A-:VII** or, if not rated by A.M. Best, as otherwise approved by the City in advance and in writing.

ADDITIONAL INSURED - **City, its elected officials, departments, officers, officials, employees, and volunteers together with, as applicable, any associated lender of the City shall be covered as additional insureds on all liability coverage** (e.g. CGL, AL, and Excess (Umbrella) Liability) as to liability arising out of work or operations performed by or on behalf of Firm including materials, parts, or equipment furnished in connection with such work or operations and automobiles owned, leased, hired, or borrowed by or on behalf of Firm. Coverage can be provided in the form of an endorsement to Firm's insurance (at least as broad as ISO Form CG 20 10 11 85 or **both** CG 10 20, CG 20 26, CG 20 33, or CG 20 38 **and** CG 20 37 if later revisions used).

CANCELLATION/NON-RENEWAL – Each insurance policy shall provide that at least 30 days written notice must be given to City of any cancellation, intent to non-renew, or material reduction in coverage (except aggregate liability limits) and at least 10 days' notice for non-payment of premium. Firm shall also have an independent duty to notify City in like manner, within 5 business days of Firm's receipt from its insurer of any notices of same. If any policy's aggregate limit is reduced, Firm shall directly take steps to have it reinstated. Notice and proof of renewal/continued coverage/certifications, etc. shall be sent to the City's notice (or Award contact) address as stated in the Agreement with a copy to the following:

☒ Contract Administration Department, 306 E Jackson St, Tampa, FL 33602 ☐ Purchasing Department, 306 E Jackson Street, Tampa, FL 33602

☐ Other: _____

CERTIFICATE OF INSURANCE (COI) – to be provided to City by insurance carrier prior to Firm beginning any work/services or taking occupancy and, if the insurance expires prior to completion of the work or services or Agreement term (as may be extended), a renewal COI at least 30 days before expiration to the above address(es). COIs shall specifically identify the Agreement and its subject (project, lease, etc.), shall be sufficiently comprehensive to insure City (named as additional insured) and Firm and to certify that coverage extends to subcontractors' acts or omissions, and as to permit the City to determine the required coverages are in place without the responsibility of examining individual policies. **Certificate Holder must be The City of Tampa, Florida.**

CLAIMS MADE – If any liability insurance is issued on a claims made form, Firm agrees to maintain such coverage uninterrupted for at least 3 years following completion and acceptance of the work either through purchase of an extended reporting provision or purchase of successive renewals. The Retroactive Date must be shown and be a date not later than the earlier of the Agreement date or the date performance/occupancy began thereunder.

DEDUCTIBLES/ SELF-INSURED RETENTIONS (SIR) – must be disclosed to City and, if over $500,000, approved by the City in advance and in writing, including at City's option being guaranteed, reduced, or eliminated (additionally if a SIR provides a financial guarantee guaranteeing payment of losses and related investigations, claim administration, and defense expenses). Firm shall be fully responsible for any deductible or SIR (without limiting the foregoing a policy with a SIR shall provide or be endorsed to provide that the SIR may be satisfied by either the City or named insured). In the event of loss which would have been covered but for a deductible or SIR, City may withhold from any payment due Firm, under any agreement with the City, an amount equal to same to cover such loss should full recovery not be obtained under the policy.

PERFORMANCE – All insurance policies shall be fully performable in Hillsborough County, Florida (the County), and construed in accordance with Florida law. Further, all insurance policies must expressly state that the insurance company will accept service of process in the County and that the exclusive venue for any action concerning any matter under those policies shall be in the appropriate state court of the County.

PRIMARY POLICIES - Firm's insurance coverage shall be primary insurance coverage at least as broad as ISO CG 20 01 04 13 as to the City, its elected officials, departments, officers, employees, and volunteers. Any insurance or self-insurance maintained by the City, its elected officials, departments, officers, employees, and volunteers shall be excess of the Firm's insurance and shall not contribute with it.

SUBCONTRACTORS/INDEPENDENT ASSOCIATES/CONSULTANTS/SUBTENANTS/SUBLICENSEE – **Firm shall require and verify that all such entities maintain insurance meeting all requirements stated herein with the City as an additional insured** by endorsement (ISO FORM CG 20 38, or broader) or otherwise include such entities within Firm's insurance policies. Upon City's request, Firm shall furnish complete and certified copies of copies of such entities' insurance policies, forms, and endorsements.

SUBCONTRACTOR DEFAULT INSURANCE, CONTROLLED INSURANCE PROGRAM, WRAP-UP. Use requires express prior written consent of City Risk Manager.

UNAVAILABILITY – To the fullest extent permitted by law, if Firm is out of business or otherwise unavailable at the time a claim is presented to City, Firm hereby assigns to the City all of its right, title and interest (but not any liabilities or obligations) under any applicable policies of insurance.

WAIVER OF SUBROGATION – With regard to any policy of insurance that would pay third party losses, Firm hereby grants City a waiver of any right to subrogation which any insurer of Firm may acquire against the City by virtue of the payment of any loss under such insurance. Firm agrees to obtain any endorsement that may be necessary to affect such waiver, but this provision shall apply to such policies regardless.

WAIVER/RELEASE AGREEMENT – Where Firm has a defined group of persons who might be exposed to harm (e.g. participants in an athletic event/program, volunteers) any waiver or release agreement used by Firm whereby such persons (and their parent/guardian as applicable) discharge Firm from claims and liabilities, shall include the City, its elected officials, departments, officers, officials, employees, and volunteers to the same extent as Firm.

Instructions Regarding Use of the WMBE/SLBE Goal Contact List

Bidders must solicit a subcontracting bid from ALL of the firms listed on the WMBE/SLBEs list provided within the Specifications, and provide documentation of emails, faxes, phone calls, letters, or other communication with the firms as a first step in demonstrating Good-Faith Efforts to achieve the goal set for WMBE/SLBE participation on this contract.

The list is formatted to facilitate e-mailing of a solicitation to the listed firms by copying and pasting the email addresses.

The WMBE/SLBE participation Goal is based upon the availability of the certified firms indicated on the contact list. The Goal and Requirements of the City's Equal Business Opportunity Program are stated in the Bid/Contract Document, Specifications.

SOLICITATION FOR SUBCONTRACTOR QUOTES

From:
OUR COMPANY NAME:
TELEPHONE NUMBER:
ADDRESS:
FAX NUMBER:
E-MAIL ADDRESS:

To Subcontractor:

Our firm is in the process of preparing a bid for a **City of Tampa Contract**. Please accept this notice as our request for quotes for the scope of work identified below. Please respond to this request by filling in the information below and returning via e-mail or fax to the address or number provided. Please contact us if you need any assistance in obtaining bonding, lines of credit, insurance, assistance in obtaining necessary equipment, supplies, materials, participation in a City-sponsored mentor-protégé program, or if you have any questions.

Plans and Specs for this project are posted at:
http://www.tampagov.net/contract-administration/programs/construction-project-bidding

CONTRACT NO.:
CONTRACT NAME:
CITY'S BID OPENING DATE:
DEADLINE FOR YOUR SUBCONTRACTOR BID OR RESPONSE:
SPECIFIC SCOPE OF WORK:

Please complete and submit with your subcontract bid or response:
YOUR FIRM'S NAME:
MAILING ADDRESS:
CITY:
STATE:
ZIP:
FAX NUMBER:
E-MAIL ADDRESS:
__Yes, my company is interested in quoting this project for the following items of work:

__No, my company will not quote this project for the following reason(s):

(Sample Suggested Sub Solicitation 3-9-9 Tampa MBDO)

City of Tampa
Official Letter of Intent
(Form MBD-40)

A Letter of Intent is required for each WMBE/SLBE listed on the Schedule of Subcontractors to be Utilized (MBD 20 Form). Letter of Intent must be signed by both the Bidder/Service Provider and WMBE/SLBE firm.

Bid/Proposal/Contract Number: _____

Bid/Proposal/Contract Name: _____

A. To be completed by the Bidder/Service Provider

Name of Bidder: _____
Address: _____
_____

Contact Person: _____
Telephone: _____ Fax: _____
Email: _____

B. To be completed by WMBE/SLBE

Name of WMBE/SLBE: _____
Address: _____
_____

Contract Person: _____
Telephone: _____Fax: _____
Email: _____

C. Identify the scope of work to be performed or item(s) to be supplied by the WMBE/SLBE. On unit price bids, identify to which bid line item the WMBE/SLBE's work scope or supply corresponds:

_____
_____
_____

D. Cost of work to be performed by WMBE/SLBE: _____

E. Cost of work to be performed by WMBE/SLBE as a percent of total City contract amount:_____

Bidder/Proposer certifies that it intends to utilize the WMBE/SLBE listed above, and that the work described above is accurate. Bidder/Proposer will provide City with copy of the related subcontract agreement and/or purchase order prior to commencement of the WMBE/SLBE's work. The WMBE/SLBE firm certifies that it has agreed to provide such work/supplies for the amount stated above.

Bidder/Proposer: _____ Date: _____
Signature and Title

WMBE/SLBE Firm: _____ Date: _____
Signature and Title

Official Letter of Intent Instructions
City of Tampa
Equal Business Opportunity Program

The Official Letter of Intent must be submitted to the soliciting department within ten (10) work days of the bid opening, prior to award. Not providing all letters of intent within the prescribed time frame may be cause to delay award or declare the bid to be non-responsive.

Bid/Proposal/Contract Number- Please provide bid/proposal/contract number provided by City of Tampa procuring department.

Bid/Proposal/Contract Name – Please provide bid/proposal/contract name provided by City of Tampa procuring department.

To be Completed by the Bidder/Service Provide – Please provide prime contractor or main bidders detailed company information as indicated.

To be completed by the WMBE/SLBE – Please provide WMBE/SLBE subcontractor detailed company information as indicated.

Bidder is to Identify the scope of work to be performed or item(s) to be supplied by the WMBE/SLBE. On unit price bids indentify, which bid line item the WMBE/SLBE's scope of work or supply corresponds – Please provide details of the services or supplies the WMBE/SLBE will provide.

Cost of work to be performed by WMBE/SLBE – Provide agreed upon estimate of work or supplies total price (Unit prices are accepted if specific quantities have yet to be determined).

Bidder/Proposer – Signature of authorized agent for the prime contractor or main bidder with date signed.

WMBE/SLBE firm – Signature of authorized agent for the WMBE/SLBE subcontractor or supplier with date signed.

Contract Confirmation – A copy of the executed subcontract agreement and/or purchase order with the WMBE/SLBE must be filed with the City of Tampa immediately upon execution and/or prior to commencement of work by WMBE/SLBE.

PROPOSAL

To the Mayor and City Council of the City of Tampa, Florida:

Legal Name of Bidder: _____

Bidder's Fictitious Name, *if applicable*: _____

Bidder is a/an: ☐ Individual ☐ Partnership* ☐ Joint Venture* ☐ LLC ☐ Corp. ☐ Other:

Bidder is organized under the laws of: ☐ State of Florida ☐ Other:

Bidder Mailing Address: _____

Bidder's Federal Employee Identification No. (FEI/EIN): _____

Bidder's License No.:_____ Bidder's FDOS (SUNBIZ) Doc. No.: _____
(See Ch. 489. FS; use entity's, individual's only if applicable)

Bidder Contact Name**: _____ Email:_____ Phone: (____) _____

Bidder's own initial application for employment has criminal history screening practices similar in nature to the practices contained in Chapter 12, Article VI, City of Tampa Code *(Responses, whether "Yes" or "No", are for informational purposes only and will not be used as a basis of award or denial, nor as a basis for any protest)*: ☐Yes ☐No

The below named person, appearing before the undersigned authority and after being first duly sworn, for him/herself and on behalf of the entity submitting this Proposal does hereby affirm and declare as follows:

(1) He/She is of lawful age and is authorized to act on behalf of Bidder (the individual, partnership, corporation, entity, etc. submitting this Proposal) and that all statements made in this document are true and correct to the best of my knowledge.

(2) If Bidder is operating under a fictitious name, Bidder has currently complied with any and all laws and procedures governing the operation of businesses under fictitious names in the State of Florida

(3) No person or entity other than Bidder has any interest in this Proposal or in the Contract proposed to be entered into.

(4) This Proposal is made without any understanding, agreement, or connection with any person or entity making Proposal for the same purposes, and is in all respects fair and without collusion or fraud.

(5) Bidder is not in arrears to the City of Tampa, upon debt or contract, and is not a defaulter, as surety or otherwise, upon any obligation to the City of Tampa.

(6) That no officer or employee or person whose salary is payable in whole or in part from the City Treasury is, shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this Proposal, or in the performance of the Contract, or in the supplies, materials, or equipment and work or labor to which it relates, or in any portion of the profits thereof.

(7) Bidder has carefully examined and fully understands the Solicitation and has full knowledge of the scope, nature, and quality of the work to be performed; furthermore, Bidder has carefully examined the site of the work and that, from his own investigations, he has satisfied himself as to the nature and location of the work, the character, quality, and quantity of materials and the kinds and extent of equipment and other facilities needed for the performance of the work, the general and local conditions and all difficulties to be encountered, and all other items which may, in any way, affect the work or its performance.

(8) Bidder (including its principals) ☐ has | ☐ has NOT been debarred or suspended from contracting with a public entity.

(9) Bidder ☐ has | ☐ has NOT implemented a drug-free workplace program that meets the requirements of Section 287.087, Florida Statutes.

(10) Bidder has carefully examined and fully understands all the component parts of the Contract Documents and agrees Bidder will execute the Contract, provide the required Public Construction Bond, and will fully perform the work in strict accordance with the terms of the Contract and Contract Documents therein referred to for the following prices, to wit:

* If a Partnership or Joint Venture, attach Partnership or Joint Venture Agreement.
** Someone the City may contact with questions/correspondence regarding this Solicitation and/or permits.

Contract Item No.	Estimated Quantity	Description and Price in Words	Computed Total Price for Item in Figures
BASE BID	LS	The work includes the furnishing of all labor, equipment, and material for construction of a new 10,011 sf facility which includes site work with parking lot apron, landscaping and irrigation utilizing Florida friendly materials, masonry exterior walls, pre-fabricated trusses, metal roofing, cement plaster and thin stone finishes, HVAC including chiller with vav system, plumbing, electrical which includes minor photovoltaics, interior finishes, any allowances that may be listed in Section 01020, and with all associated work required for a complete project in accordance with the Contract Documents. _____ _____ dollars and _____ cents (BASE BID) LS	$_____

Computed Total Price in Words: _____

_____ dollars and _____ cents.

Computed Total Price in Figures: $_____

Bidder acknowledges that the following addenda have been received and that the changes covered by the addendum(s) have been taken into account in this proposal: #1 ____ #2 ____ #3 ____ #4 ____ #5 ____ #6 ____ #7 ____ #8 ____.

Bidder acknowledges the requirements of the City of Tampa's Equal Business Opportunity Program.

Bidder acknowledges that it is aware of Florida's Trench Safety Act (Sections 553.60-553.64, Florida Statutes), and agrees that Bidder together with any involved subcontractors will comply with all applicable trench safety standards. Bidder further acknowledges that included in the various items of this Proposal and the total bid price (as applicable) are costs for complying with the Trench Safety Act. Bidder further identifies the costs and methods summarized below:

	Trench Safety Measure (Description)	Unit of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
A.					
B.					
C.					

Total Cost: $ _____

Accompanying this Proposal is a certified check, cashier's check or Tampa Bid Bond (form included herein must be used) for at least five percent (5%) of the total amount of the Proposal which check shall become the property of the City, or which bond shall become forthwith due and payable to the City, if this Proposal shall be accepted by the City and the Bidder shall fail to enter into a legally binding contract with and to furnish the required Public Construction Bond to the City within twenty (20) days after the date of its receipt of written Notice of Award by the City so to do.

FAILURE TO COMPLETE THE ABOVE MAY RESULT IN THE PROPOSAL BEING DECLARED NON-RESPONSIVE.

[SEAL]

Name of Bidder: _____

Authorized Signature: _____

Signer's Printed Name: _____

Signer's Title: _____

STATE OF _____

COUNTY OF _____

For an entity: The forgoing instrument was sworn (or affirmed) before me this ____ day of _____, 20____ by _____ as _____ of _____, a/n □ Partnership □ Joint Venture □ LLC □ Corp □ Other:_____, on behalf of such entity. Such individual is □ personally known to me or □ produced a/n _____ state driver's license as identification.

For an individual: The forgoing instrument was sworn (or affirmed) before me this ____ day of _____, 20____ by _____, who is □ personally known to me or □ produced a/n _____ state driver's license as identification.

[NOTARY SEAL]

_____

Notary Public, State of _____

Notary Printed Name: _____

Commission No.: _____

My Commission Expires: _____

Good Faith Effort Compliance Plan Guidelines

for Women/Minority Business Enterprise\Small Local Business Enterprise Participation
City of Tampa - Equal Business Opportunity Program
(MBD Form 50 – detailed instructions on page 2 of 2)

Contract Name_____ Bid Date _____

Bidder/Proposer_____

Signature _____ Date _____

Name _____ Title _____

The Compliance Plan with attachments is a true account of Good Faith Efforts (GFE) made to achieve the participation goals as specified for Women/Minority Business Enterprises/Small Local Business Enterprises (WMBE/SLBE) on the referenced contract:

□ The WMBE/SLBE participation Goal is Met or Exceeded. See DMI Forms 10 and 20 which accurately report all subcontractors solicited and all subcontractors to-be-utilized.

□ The WMBE/SLBE participation Goal is Not Achieved. The following list is an overview of the baseline GFE action steps already performed. Furthermore, it is understood that these GFE requirements are weighted in the compliance evaluation based on the veracity and demonstrable degree of documentation provided with the bid/proposal:

(Check applicable boxes below. Must enclose supporting documents accordingly with remarks)

(1) Solicited through reasonable and available means the interest of WMBE/SLBEs that have the capability to perform the work of the contract. The Bidder or Proposer must solicit this interest within sufficient time to allow the WMBE/SLBEs to respond. The Bidder or Proposer must take appropriate steps to follow up initial solicitations with interested WMBE/SLBEs. □ See DMI report forms for subcontractors solicited. □ See enclosed supplemental data on solicitation efforts. □ Qualifying Remarks:

(2) Provided interested WMBE/SLBEs with adequate, specific scope information about the plans, specifications, and requirements of the contract, including addenda, in a timely manner to assist them in responding to the requested-scope identified by bidder/proposer for the solicitation. □ See enclosed actual solicitations used. □ Qualifying Remarks:

(3) Negotiated in good faith with interested WMBE/SLBEs that have submitted bids (e.g. adjusted quantities or scale). Documentation of negotiation must include the names, addresses, and telephone numbers of WMBE/SLBEs that were solicited; the date of each such solicitation; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why agreements could not be reached with WMBE/SLBEs to perform the work. Additional costs involved in soliciting and using subcontractors is not a sufficient reason for a bidder/proposer's failure to meet goals or achieve participation, as long as such costs are reasonable. Bidders are not required to accept excessive quotes in order to meet the goal.
□ DMI Utilized Forms for sub-(contractor/consultant) reflect genuine negotiations □ This project is an RFQ/RFP in nature and negotiations are limited to clarifications of scope/specifications and qualifications. □ See enclosed documentation. □ Qualifying Remarks:

(4) Not rejecting WMBE/SLBEs as being unqualified without justification based on a thorough investigation of their capabilities. The WMBE/SLBEs standing within its industry, membership in specific groups, organizations / associations and political or social affiliations are not legitimate causes for rejecting or not soliciting bids to meet the goals.
□ Not applicable. □ See attached justification for rejection of a subcontractor's bid or proposal. □ Qualifying Remarks:

(5) Made scope(s) of work available to WMBE/SLBE subcontractors and suppliers; and, segmented portions of the work or material consistent with the available WMBE/SLBE subcontractors and suppliers, so as to facilitate meeting the goal. □ Sub-Contractors were allowed to bid on their own choice of work or trade without restriction to a pre-determined portion. □ See enclosed comments. □ Qualifying Remarks:

(6) Made good faith efforts, despite the ability or desire of Bidder/Proposer to perform the work of a contract with its own forces/organization. A Bidder/Proposer who desires to self-perform the work of a contract must demonstrate good faith efforts if the goal has not been met. □ Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime. □ Qualifying Remarks:

(7) Segmented portions of the work to be performed by WMBE/SLBEs in order to increase the likelihood that the goals will be met. This includes, where appropriate, breaking out contract work items into economically feasible units (quantities/scale) to facilitate WMBE/SLBE participation, even when the Bidder/Proposer might otherwise prefer to perform these work items with its own forces. □ Sub-Contractors were allowed to bid on their own choice of work or trade without restriction to a pre-determined portion. □ Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime. □ See enclosed comments. □ Qualifying Remarks:

(8) Made efforts to assist interested WMBE/SLBEs in obtaining bonding, lines of credit, or insurance as required by the city or contractor.
□ See enclosed documentation on initiatives undertaken and methods to accomplish. □ Qualifying Remarks:

(9) Made efforts to assist interested WMBE/SLBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, including participation in an acceptable mentor-protégé program. □ See enclosed documentation of initiatives and/or agreements. □ Qualifying Remarks:

(10) Effectively used the services of the City and other organizations that provide assistance in the recruitment and placement of WMBE/SLBEs.
□ See enclosed documentation. □ The following services were used:

Note: Provide any unsolicited information that will support the Bid/RFP Compliance Evaluation. □ Named Documents Are:

Participation Plan: Guidance for Complying with Good Faith Efforts Outreach

1. All firms on the WMBE/SLBE Goal Setting List must be solicited and documentation provided for email, fax, letters, phone calls, and other methods of outreach/communication with the listed firms. The DMI Solicited and DMI-Utilized forms must be completed for all firms solicited or utilized. Other opportunities for subcontracting may be explored by consulting the City of Tampa MBD Office and/or researching the on-line Diversity Management Business System Directory for Tampa certified WMBE/SLBE firms.

2. Solicitation of WMBE/SLBEs, via written or electronic notification, should provide specific information on the services needed, where plans can be reviewed and assistance offered in obtaining these, if required. Solicitations should be sent a minimum of a week (i.e. 5 business days or more) before the bid/proposal date. Actual copies of the bidder's solicitation containing their scope specific instructions should be provided.

3. With any quotes received, a follow-up should be made when needed to confirm detail scope of work. For any WMBE/SLBE low quotes rejected, an explanation Shall be provided detailing negotiation efforts.

4. If a low bid WMBE/SLBE is rejected or deemed unqualified the contractor must provide an explanation and supporting documentation for this decision.

5. Prime Shall break down portions of work into economical feasible opportunities for subcontracting. The WMBE/SLBE directory may be useful in identifying additional subcontracting opportunities and firms not listed in the "WMBE/SLBE Goal Setting Firms List."

6. Contractor Shall not preclude WMBE/SLBEs from bidding on any part of work, even if the Contractor may desire to self-perform the work.

7. Contractor Shall avoid relying solely on subcontracting out work-scope where WMBE/SLBE availability is not sufficient to attain the pre-determined subcontract goal set for the Bid or when targeted sub-consultant participation is stated within the RFP/RFQ.

8. In its solicitations, the Bidder should offer assistance to WMBE/SLBEs in obtaining bonding, insurance, et cetera, if required of subcontractors by the City or Prime Contractor.

9. In its solicitation, the Bidder should offer assistance in obtaining equipment for a specific job to WMBE/SLBEs, if needed.

10. Contractor should use the services offered by such agencies as the City of Tampa Minority and Small Business Development Office, Hillsborough County Entrepreneur Collaborative Center, Hillsborough County Economic Development Department's MBE/SBE Program and the NAACP Empowerment Center to name a few for the recruitment and placement of WMBEs/SLBEs.

Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive

Page 1 of 4 – DMI Solicited/Utilized Schedules
City of Tampa – Schedule of All Solicited Sub-(Contractors/Consultants/Suppliers)
(FORM MBD-10)

Contract No.:_____ Contract Name:_____
Company Name:_____ Address:_____
Federal ID:_____ Phone:_____ Fax:_____ Email:_____

Check applicable box(es). Detailed Instructions for completing this form are on page 2 of 4.
[ ] No Firms were contacted or solicited for this contract.
[ ] No Firms were contacted because:_____
[ ] See attached list of additional Firms solicited and all supplemental information (List must comply to this form)
Note: Form MBD-10 must list ALL subcontractors solicited including Non-minority/small businesses

NIGP Code Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

S = SLBE W=WMBE O = Neither Federal ID	Company Name Address Phone, Fax, Email	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade or Services NIGP Code (listed above)	Contact Method L=Letter F=Fax E=Email P=Phone	Quote or Response Received Y/N

It is hereby certified that the information provided is an accurate and true account of contacts and solicitations for sub–contracting opportunities on this contract.

Signed:_____ Name/Title:_____ Date:_____

Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive
Forms must be included with Bid / Proposal

Instructions for completing The Sub-(Contractors/Consultants/ Suppliers) Solicited Form (Form MBD-10)

This form must be submitted with all bids or proposals. **All** subcontractors (regardless of ownership or size) solicited and subcontractors from whom unsolicited quotations were received must be included on this form. The instructions that follow correspond to the headings on the form required to be completed. Note: Ability or desire to self-perform all work shall not exempt the prime from Good Faith Efforts to achieve participation.

- **Contract No.** This is the number assigned by the City of Tampa for the bid or proposal.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba) if applicable.
- **Address.** The physical address of your business.
- **Federal ID.** FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Firms were contacted or solicited for this contract.** Checking the box indicates that a pre-determined Subcontract Goal or Participation Plan Requirement was not set by the City resulting in your business not using subcontractors and will self-perform all work. If during the performance of the contract you employ subcontractors, the City must pre-approve subcontractors. Use of the "Sub-(Contractors/Consultants/Suppliers) Payments" form (MBD Form-30) must be submitted with every pay application and invoice. Note: Certified SLBE or WMBE firms bidding as Primes are not exempt from outreach and solicitation of subcontractors.
- **No Firms were contacted because.** Provide brief explanation why no firms were contacted or solicited.
- **See attached documents.** Check box, if after you have completed the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the form. All DMI data not submitted on the MBD Form-10 must be in the same format and have all requested data from MBD Form-10 included.

The following instructions are for information of any and all subcontractors solicited.

- **"S" = SLBE, "W" = WMBE.** Enter "**S**" for firms Certified by the City as Small Local Business Enterprises and/or "**W**" for firms Certified by the City as either Women/Minority Business Enterprise; **"O" = Non-certified others**.
- **Federal ID.** FIN. A number assigned to a business for tax reporting purposes. This information is critical in proper identification and payment of the contractor/subcontractor.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **Trade, Services, or Materials** indicate the trade, service, or materials provided by the subcontractor. NIGP codes aka "National Institute of Governmental Purchasing" are listed at top section of document.
- **Contact Method L=letter, F=fax, E=Email, P=Phone.** Indicate with letter the method(s) of soliciting for bid.
- **Quote or Resp. (response) Rec'd (received) Y/N**. Indicate "Y" Yes if you received a quotation or if you received a response to your solicitation. Indicate "N" No if you received no response to your solicitation from the subcontractor. Must keep records: log, ledger, documentation, etc. that can validate/verify.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Minority and Small Business Development Office at (813) 274-5522.

Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive

Page 3 of 4 – DMI Solicited/Utilized Schedules
City of Tampa – Schedule of All To-Be-Utilized Sub-(Contractors/Consultants/Suppliers)
(FORM MBD-20)

Contract No.:_____ Contract Name:_____
Company Name:_____ Address:_____
Federal ID:_____ Phone:_____ Fax:_____ Email:_____

Check applicable box(es). Detailed Instructions for completing this form are on page 4 of 4.
[ ] See attached list of additional Firms Utilized and all supplemental information (List must comply to this form)
Note: Form MBD-20 must list ALL subcontractors To-Be-Utilized including Non-minority/small businesses
[ ] No Subcontracting/consulting (of any kind) will be performed on this contract.
[ ] No Firms are listed to be utilized because:_____

NIGP Code General Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

Enter "S" for firms Certified as Small Local Business Enterprises, "W" for firms Certified as Women/Minority Business Enterprise, "O" for Other Non-Certified

S = SLBE W=WMBE O =Neither Federal ID	Company Name Address Phone, Fax, Email	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic Am. AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade, Services, or Materials NIGP Code Listed above	$ Amount of Quote. Letter of Intent (LOI) if available	Percent of Scope or Contract %

Total ALL Subcontract / Supplier Utilization $_____
Total SLBE Utilization $ _____
Total WMBE Utilization $ _____
Percent SLBE Utilization of Total Bid/Proposal Amt. _____% Percent WMBE Utilization of Total Bid/Proposal Amt. _____%

It is hereby certified that the following information is a true and accurate account of utilization for sub-contracting opportunities on this Contract.

Signed:_____ Name/Title:_____ Date:_____

Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive
Forms must be included with Bid / Proposal

Instructions for completing The Sub-(Contractors/Consultants/ Suppliers) to be Utilized Form

(Form MBD-20)

This form must be submitted with all bids or proposals. All subcontractors (regardless of ownership or size) projected to be utilized must be included on this form. Note: Ability or desire to self-perform all work shall not exempt the prime from Good Faith Efforts to achieve participation.

Contract No. This is the number assigned by the City of Tampa for the bid or proposal.

- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba) if applicable.
- **Address.** The physical address of your business.
- **Federal ID.** FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Subcontracting/consulting (of any kind) will be performed on this contract.** Checking box indicates your business will not use subcontractors when no Subcontract Goal or Participation Plan Requirement was set by the City, but will self-perform all work. When subcontractors are utilized during the performance of the contract, the "Sub-(Contractors/Consultants/Suppliers) Payments" form (MBD Form-30) must be submitted with every pay application and invoice. Note: certified SLBE or WMBE firms bidding as Primes are not exempt from outreach and solicitation of subcontractors, including completion and submitting Form-10 and Form-20.
- **No Firms listed To-Be-Utilized.** Check box; provide brief explanation why no firms were retained when a goal or participation plan requirement was set on the contract. Note: mandatory compliance with Good Faith Effort outreach (GFECP) requirements applies (MBD Form-50) and supporting documentation must accompany the bid.
- **See attached documents.** Check box, if after completing the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the scope/value/percent utilization of subcontractors. Reproduce copies of MBD-20 and attach. All data not submitted on duplicate forms must be in the same format and content as specified in these instructions.

The following instructions are for information of Any and All subcontractors To Be Utilized.

- **Federal ID.** FIN. A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **"S" = SLBE, "W" = WMBE.** Enter "**S**" for firms Certified by the City as Small Local Business Enterprises and/or "**W**" for firms Certified by the City as Women/Minority Business Enterprise; **"O" = Non-certified others**.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **Trade, Services, or Materials (NIGP code if Known)** Indicate the trade, service, or material provided by the subcontractor. Abbreviated list of NIGP is available at http:/www.tampagov.net/mbd "Information Resources".
- **Amount of Quote, Letters of Intent** (required for both SLBEs and WMBEs).
- **Percent of Work/Contract.** Indicate the percent of the total contract price the subcontract(s) represent. For CCNA only (i.e. Consultant A/E Services) you must indicate subcontracts as percent of total scope/contract.
- **Total Subcontract/Supplier Utilization.** – Provide total dollar amount of all subcontractors/suppliers projected to be used for the contract. (Dollar amounts may be optional in CCNA depending on solicitation format).
- **Total SLBE Utilization.** Provide total dollar amount for all projected SLBE subcontractors/Suppliers used for this contract. (Dollar amounts may be optional in CCNA proposals depending on the solicitation format).
- **Total WMBE Utilization.** Provide total dollar amount for all projected WMBE subcontractors/Suppliers used for this contract. (Dollar amounts may be optional in CCNA proposals depending on the solicitation format).
- **Percent SLBE Utilization.** Total amount allocated to SLBEs divided by the total bid/proposal amount.
- **Percent WMBE Utilization.** Total amount allocated to WMBEs divided by the total bid/proposal amount.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Minority and Small Business Development Office at (813) 274-5522.

TAMPA BID BOND

Contract 17-C-00037; Fire Station 23 Improvements

KNOW ALL MEN BY THESE PRESENTS, that we, _____

_____

(hereinafter called the Principal) and _____

(hereinafter called the Surety) a Corporation chartered and existing under the laws of the State of _____, with its principal offices in the City of _____, and authorized to do business in the State of Florida, are held and firmly bound unto the City of Tampa, a Municipal Corporation of Hillsborough County, Florida, in the full and just sum of 5% of the amount of the (Bid) (Proposal) good and lawful money of the United States of America, to be paid upon demand of the City of Tampa, Florida, to which payment will and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally and firmly these presents.

WHEREAS, the Principal is about to submit, or has submitted to the City of Tampa, Florida, a Proposal for the construction of certain facilities for the City designated Contract 17-C-00037, Fire Station 23 Improvements.

WHEREAS, the Principal desires to file this Bond in accordance with law, in lieu of a certified Bidder's check otherwise required to accompany this Proposal.

NOW, THEREFORE: The conditions of this obligation are such that if the Proposal be accepted, the Principal shall, within twenty (20) days after the date of receipt of written Notice of Award, execute a contract in accordance with the Proposal and upon the terms, conditions and price set forth therein, in the form and manner required by the City of Tampa, Florida and execute a sufficient and satisfactory Public Construction Bond payable to the City of Tampa, Florida in an amount of one hundred percent (100%) of the total contract price, in form and with security satisfactory to said City, then this Bid Bond obligation is to be void; otherwise to be and remain in full force and virtue in law, and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid City, upon demand, the amount thereof, in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20___.

Principal _____

BY _____

TITLE _____

BY _____

TITLE _____

(SEAL)

_____
Producing Agent

_____
Producing Agent's Address

_____
Name of Agency

_____
The addition of such phrases as "not to exceed" or like import shall render the (Bid) (Proposal)non-responsive.

AGREEMENT

For furnishing all labor, materials and equipment, together with all work incidental thereto, necessary and required for the performance of the work for the construction of Contract 17-C-00037 in accordance with your Proposal dated _____, amounting to a total of $_____ as completed in accordance with subsections I-2.09 and I-2.10 of the Instruction to Bidders.

This AGREEMENT, made and entered into in triplicate, between the City of Tampa, Florida, hereinafter called the City, and _____ hereinafter called the Contractor, as of the _____ day of _____, 20___ when the City Council of the City of Tampa, Florida adopted a Resolution authorizing, among other things, the Mayor's execution of this Agreement.

WITNESSETH that, in consideration of the mutual stipulations, agreements, and covenants herein contained, the parties hereto have agreed and hereby agree with each other, the Party of the First Part for itself, its successors and assigns, and the Party of the Second Part for itself, or himself, or themselves, and its successors and assigns, or his or their executors, administrators and assigns, as follows:

Contract 17-C-00037; Fire Station 23 Improvements, shall include, but not be limited to, construction of a new 10,011 sf facility which includes site work with parking lot apron, landscaping and irrigation utilizing Florida friendly materials, masonry exterior walls, pre-fabricated trusses, metal roofing, cement plaster and thin stone finishes, HVAC including chiller with vav system, plumbing, electrical which includes minor photovoltaics, interior finishes, with all associated work required for a complete project in accordance with the Contract Documents.

Contract Documents referred to in Article 1.01 of this Agreement also includes this volume, applicable standard drawings, the plans and any provisions referred to whether actually attached or not.

TAMPA AGREEMENT

SECTION 1
GENERAL

ARTICLE 1.01 THE CONTRACT

Except for titles, subtitles, headings, running headlines, and tables of contents (all of which are printed herein merely for convenience), the following, except for such portions thereof as may be specifically excluded, constitute the Contract:

The Notice to Bidders;
The Instructions to Bidders, including Special Instructions and General Instructions;
The Proposal;
The Bid Bond;
The Certification of Nonsegregated Facilities;
The Notice of Award;
The Agreement;
The Performance Bond;
The Notice To Proceed;
The Specifications, including the General Provisions, the Workmanship and Materials, the Specific Provisions or the Contract Items
The Plans;
All Supplementary Drawings Issued after award of the Contract;
All Addenda issued by the City prior to the receipt of proposals;
All provisions required by law to be inserted in this Contract, whether actually inserted or not.

ARTICLE 1.02 DEFINITIONS

The following words and terms, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless different meaning is clear from the context:

(a)"City" shall mean the City of Tampa, Florida, represented by its Mayor and City Council, Party of the First Part, or such other City official as shall be duly empowered to act for the City on matters relating to this Contract.

(b)"Contractor" shall mean the Party of the Second Part hereto, whether corporation, firm or individual, or any combination thereof, and its, their, or his successors, personal representatives, executors, administrators, and assigns, and any person, firm or corporation who or which shall at any time be substituted in the place of the Party of the Second Part under this Contract.

(c)"Engineer" shall mean the Director of the Department or his duly authorized representative.

(d)"Consultant" shall mean the engineering or architectural firm or individual employed by the City to consult with and advise the City in the construction of the project.

(e)"Surety" shall mean any person, firm or corporation that has executed as Surety the Contractor's Performance Bond securing the performance of this Contact.

(f)"The Work" shall mean everything expressly or implied required to be furnished and done by the Contractor under the Contract, and shall include both Contract Work and Extra Work.

(g)"Contract Work" shall mean everything expressly or implied required to be furnished and done by the Contractor by any one or more of the Contract parts referred to in Article 1.01 hereof, except Extra Work, as hereinafter defined; it being understood that, in case of any inconsistency in or between any part or parts of this Contract, the Engineer shall determine which shall prevail.

(h)"Contract" or "Contract Documents" shall mean each of the various part of the Contract referred to in Article 1.01 hereof, both as a whole and severally.

(i)"Extra Work" shall mean work other than that required either expressly or implied by the contract in its present form.

(j)"Plans" shall mean only those drawings specifically referred to as such in these documents, or in any Addendum. Drawings issued after the execution of the Contract to explain further, or to illustrate, or to show changes in the work, will be known as "Supplementary Drawings" and shall be binding upon the Contractor with the same force as the Plans.

(k)"Specifications" shall mean all of the directions, requirements, and standards of performance applying to the work, as hereinafter detailed and designated as such, or which may be issued in an addendum.

(l)"Addendum or Addenda" shall mean the additional contract provisions issued in writing prior to the receipt of bids.

(m)"Notice" shall mean written notice. Notice shall be served upon the Contractor, either personally or by leaving the said notice at his residence or with any employee found on the work, or addressed to the Contractor at the residence or place of business given in his proposal and deposited in a postpaid wrapper in any post office box regularly maintained by the United States Post Office.

(n)"Project" shall mean the entire improvement package or related work. The "project" may consist of several different, but related, contracts.

(o)"Site" shall mean, and be limited to, the area upon or in which the Contractor's operations are carried on and such other appropriate areas as may be designed as such by the Engineer.

(p)"Subcontractor" shall mean any person, firm, or corporation, other than employees of the Contractor, who or which contracts with the Contractor to furnish, or actually furnishes labor, or labor and materials, or labor and equipment or labor, materials, and equipment at the site.

(q)Whenever in the Contract the words "directed", "required", "permitted", "ordered", "designated", "prescribed", and words of like import are used, they shall imply the direction, requirement, permission, order, designation, or prescription of the Engineer; and "approved", "acceptable", "satisfactory", "in the judgement of", and words of like import shall mean approved by, or acceptable to, or satisfactory to, or in the judgment of the Engineer.

(r)Whenever in the Contract the word "day" is used, it shall mean calendar day.

(s)"Final Acceptance" shall mean acceptance of the

work as evidenced by an official resolution of the City. Such acceptance shall be deemed to have taken place only if and when an approving resolution has been adopted by the City Council. The final acceptance shall be signed only after the City has assured itself by tests, inspection, or otherwise, that all of the provisions of the Contract have been carried out to its satisfaction.

(t)"Eastern Standard Time" shall be construed as the time being observed in the City on the day proposals are received or other documents issued or signed.

SECTION 2
POWERS OF THE CITY'S REPRESENTATIVES

ARTICLE 2.01 THE ENGINEER

It is covenanted and agreed that the Engineer, in addition to those matters elsewhere herein expressly made subject to his determination, direction, or approval, shall have the power, subject to such express provisions and limitations herein contained as are not in conflict herewith, and subject to review by the Mayor and City Council:

(a)To monitor the performance of the work.

(b)To determine the amount, kind, quality, sequence, and location of the work to be paid for hereunder and, when completed, to measure such work for payment.

(c)To determine all questions of an engineering character in relation to the work, to interpret the Plans, Specifications and Addenda.

(d)To determine how the work of this Contract shall be coordinated with the work of other contractors engaged simultaneously on this project.

(e)To make minor changes in the work as he deems necessary, provided such changes do not result in a net increase in the cost to the City or to the Contractor of the work to be done under the Contract.

(f)To amplify the Plans, add explanatory information and furnish additional Specifications and Drawings consistent with the intent of the Contract Documents.

The power of the Engineer shall not be limited to the foregoing enumeration, for it is the intent of this Contract that all of the work shall be subject to his determinations and approval, except where the determination or approval of someone other than the Engineer is expressly called for herein and except as subject to review by the Mayor and City Council. All orders of the Engineer requiring the Contractor to perform work as Contract work shall be promptly obeyed by the Contractor.

The Engineer shall not, however, have the power to issue an extra work order, and the performance of such work on the order of the Engineer without previously obtaining written confirmation thereof from the Mayor in accordance with Article 7.02 hereof may constitute a waiver of any right to extra compensation therefor. The Contractor is warned that the Engineer has no power to change the terms and provisions of this Contract, except minor changes where such change results in no net increase in the Contract Price.

ARTICLE 2.02 DIRECTOR

The Director of the Department in addition to those matters expressly made subject to his determination, direction or approval in his capacity as "Engineer", shall also have the power:

(a)To review any and all questions in relation to this Contract and its performance, except as herein otherwise specifically provided, and his determination upon such review shall be final and conclusive upon the Contractor.

(b)With the approval of the Mayor and City Council to authorize modifications or changes in the Contract so as to require: (1) the performance of extra work, or (2) the omission of Contract work whenever he deems it in the interest of the City to do so, or both.

(c)To suspend the whole or any part of the work whenever, in his judgment, such suspension is required: (1) in the interest of the City generally, or (2) to coordinate the work of the various Contractors engaged on this project, or (3) to expedite the completion of the entire project, even though the completion of this particular Contract may be thereby delayed, without compensation to the Contractor for such suspension other than extending the time for the completion of the work, as much as it may have been, in the opinion of the City, delayed by such a suspension.

(d)If, before the final acceptance of all the work contemplated herein, it shall be deemed necessary to take over, use, occupy, or operate any part of the completed or partly completed work, the Engineer shall have the right to do so and the Contractor will not, in any way, interfere with or object to the use, occupation, or operation of such work by the City after receipt of notice in writing from the Engineer that such work or part thereof will be used by the City on and after the date specified in such notice. Such taking over, use, occupancy or operation of any part of the completed or partially completed work shall not constitute final acceptance or approval of any such part of the work.

ARTICLE 2.03 NO ESTOPPEL

The City shall not, nor shall any department, officer, agent, or employee thereof, be bound, precluded, or estopped by any determination, decision, acceptance, return, certificate, or payment made or given under or in connection with this Contract by any officer, agent or employee of the City at any time either before or after final completion and acceptance of the work and payment therefor: (a) from showing the true and correct classification, amount, quality, or character of the work done, or that any determination, decision, acceptance, return certificate or payment is untrue, incorrect or improperly made in any particular, or that the work or any part thereof does not in fact conform to the requirements of the Contract Documents, and (b) from demanding and recovering from the Contractor any overpayments made to him or such damages as it may sustain by reason his failure to comply with the requirements of the Contract of Documents, or both.

ARTICLE 2.04 NO WAIVER OF RIGHTS

Neither the inspection, nor any order, measurements or certificate of the City or its employees, officers, or agents, nor by any order of the City for payment of money, nor any money, nor payments for or acceptance of the whole or any part of the work by the City, nor any extension of time, nor any changes in the Contract, Specifications or Plans, nor any possession by the City or its employees shall operate as a

waiver of any provisions of this Contract, nor any power herein provided nor shall any waiver of any breach of this Contract be held as a waiver of any other subsequent breach.

Any remedy provided in this Contract shall be taken and construed as cumulative, namely, in addition to each and every other suit, action, or legal proceeding. The City shall be entitled as of right to an injunction against any breach of the provisions of this Contract.

SECTION 3
PERFORMANCE OF WORK

ARTICLE 3.01 CONTRACTOR'S RESPONSIBILITY
The Contractor shall do all the work and furnish, at his own cost and expense, all labor, materials, equipment, and other facilities, except as herein otherwise provided, as may be necessary and proper for performing and completing the work under this Contract. The Contractor shall be responsible for the entire work until completed and finally accepted by the City.

The work shall be performed in accordance with the true intent and meaning of the Contract Documents. Unless otherwise expressly provided, the work must be performed in accordance with the best modern practice, with materials as specified and workmanship of the highest quality, all as determined by and entirely to the satisfaction of the Engineer.

Unless otherwise expressly provided, the means and methods of construction shall be such as the Contractor may choose, subject, however, to the approval of the Engineer. Only adequate and safe procedure, methods, structures and equipment shall be used. The Engineer's approval or the Engineer's failure to exercise his right thereon shall not relieve the Contractor of obligations to accomplish the result intended by the Contract, nor shall such create a cause of action for damages.

ARTICLE 3.02 COMPLIANCE WITH LAWS
The Contractor must comply with all local, State and Federal laws, rules, ordinances and regulations applicable to this Contract and to the work done hereunder, and must obtain, at his own expense, all permits, licenses or other authorization necessary for the prosecution of the work.

No work shall be performed under this Contract on Sundays, legal holidays or after regular working hours without the express permission of the Engineer. Where such permission is granted, the Engineer may require that such work be performed without additional expense to the City.

ARTICLE 3.03 INSPECTION
During the progress of the work and up to the date of final acceptance, the Contractor shall, at all times, afford the representatives of the City, the Florida Department of Environmental Regulation, and if applicable, the Federal Environmental Protection Agency and the Federal Department of Labor every reasonable, safe and proper facility for inspecting the work done or being done at the site. The inspection of any work shall not relieve the Contractor of any of his obligations to perform proper and satisfactory work as herein specified. Finished or unfinished work found not to be in strict accordance with the Contract shall be replaced as directed by the Engineer, even though such work may have been previously approved and payment made therefor.

The City shall have the right to reject materials and workmanship which are defective or require their correction. Rejected work and materials must be promptly removed from the site, which must at all times be kept in a reasonably clean and neat condition.

Failure or neglect on the part of the City to condemn or reject bad or inferior work or materials shall not be construed to imply an acceptance of such work or materials, if it becomes evident at any time prior to the final acceptance of the work by the City. Neither shall it be construed as barring the City at any subsequent time from the recovery of damages of such a sum of money as may be needed to build anew all portions of the work in which inferior work or improper materials were used, wherever found.

Should it be considered necessary or advisable by the City at any time before final acceptance of the entire work to make examinations of work already completed, by removing or tearing out all or portions of such work, the Contractor shall, on request, promptly furnish all necessary facilities, labor, and material for that purpose. If such work is found to be defective in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the cost of examination and restoration of the work shall be considered an item of extra work to be paid for in accordance with the provisions of Article 7.02 hereof.

ARTICLE 3.04 PROTECTION
During performance and until final acceptance, the Contractor shall be under an absolute obligation to protect the finished and unfinished work against any damage, loss, or injury. The Contractor shall take proper precaution to protect the finished work from loss or damage, pending completion and the final acceptance of all the work included in the entire Contract, provided that such precaution shall not relieve the Contractor from any and all liability and responsibility for loss or damage to the work occurring before final acceptance by the City. Such loss or damage shall be at the risk of and borne by the Contractor, whether arising from acts or omissions of the Contractor or others. In the event of any such loss or damage, the Contractor shall forthwith repair, replace, and make good the work without extension of time therefor, except as may be otherwise provided herein.

The provisions of this Article shall not be deemed to create any new right of action in favor of third parties against the Contractor or the City.

ARTICLE 3.05 PRESERVATION OF PROPERTY

The Contractor shall preserve from damage all property along the line of the work, or which is in the vicinity of or is in anywise affected by the work, the removal or destruction of which is not called for by the Plans. This applies, but is not limited, to the public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, public streets (except natural wear and tear of streets resulting from legitimate use thereof by the Contractor), and wherever such property is damaged due to the activities of the Contractor, it shall be immediately restored to its original condition by the Contractor and at his own expense.

In case of failure on the part of the Contractor to restore such property, or make good such damage or injury, the City may, upon forty-eight (48) hour written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any monies due or which may become due the Contractor under this Contract. Nothing in this clause shall prevent the Contractor from receiving proper compensation for the removal, damage, or replacement of any public or private property not shown on the Plans, when this is made necessary by alteration of grade or alignment authorized by the Engineer, provided that such property has not been damaged through fault of the Contractor, his employees or agents.

ARTICLE 3.06 BOUNDARIES
The Contractor shall confine his equipment, apparatus, the storage of materials, supplies and apparatus of his workmen to the limits indicated on the plans, by law, ordinances, permits or direction of the Engineer.

ARTICLE 3.07 SAFETY AND HEALTH REGULATIONS
The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL91-54).

ARTICLE 3.08 TAXES
All taxes of any kind and character payable on account of the work done and materials furnished under this Contract shall be paid by the Contractor and shall be deemed to have been included in his bid. The laws of the State of Florida provide that sales and use taxes are payable by the Contractor upon the tangible personal property incorporated in the work and such taxes shall be paid by the Contractor and shall be deemed to have been included in his bid.

ARTICLE 3.09 ENVIRONMENTAL CONSIDERATIONS
The Contractor, in the performance of the work under this Contract, shall comply with all Local, State and Federal laws, statutes, ordinances, rules and regulations applicable to protection of the environment; and, in the event he violates any of the provisions of same, he shall be answerable to the Local, State and Federal agencies designated by law to protect the environment. In the event the City receives, from any of the environmental agencies, a citation which is occasioned by an act or omission of the Contractor or his subcontractor or any officers, employees or agents of either, it is understood and agreed that the Contractor shall automatically become a party-respondent under said citation; and the City immediately shall notify the Contractor and provide him with a copy of said citation.

The Contractor shall comply with the requirements of the citation and correct the offending conditions(s) within the time stated in said citation and further shall be held fully responsible for all fines and/or penalties.

SECTION 4
TIME PROVISIONS

ARTICLE 4.01 TIME OF START AND COMPLETION
The Contractor must commence work within thirty (30) days subsequent to the date of the receipt of the "Notice to Proceed" by the City unless otherwise provided in the Specific Provisions and Special Instructions. Time being of the essence of this Contract, the Contractor shall thereafter prosecute the work diligently, using such means and methods of construction as well as secure its full completion in accordance with the requirements of the Contract Documents no later than the date specified therefor, or on the date to which the time for completion may be extended.

The Contractor must complete the work covered by this Contract in the number of consecutive calendar days set forth in the Instructions to Bidders, unless the date of completion is extended pursuant to the provisions of Article 4.05 hereof. The period for performance shall start from the date of signing of this Agreement by the City.

The actual date of completion will be established after a final inspection as provided in Article 4.07 hereof.

ARTICLE 4.02 PROGRESS SCHEDULE
To enable the work to be laid out and prosecuted in an orderly and expeditious manner, the Contractor shall submit to the Engineer a proposed progress schedule within fifteen (15) days after the award of this Contract.

The schedule shall state the Contract starting date, time for completion and date of completion and shall show the anticipated time of starting and completion of each of the various operations to be performed under this Contract, together with all necessary and appropriate information regarding sequence and correlation of work and an estimated time required for the delivery of all materials and equipment required for the work. The proposed schedule shall be revised as directed by the Engineer until finally approved by him, and, after such approval, shall be strictly adhered to by the Contractor. The approved progress schedule may be changed only with the written permission of the Engineer.

If the Contractor shall fail to adhere to the approved progress schedule or the schedule as revised, he shall promptly adopt such other or additional means and methods of construction as will make up for the time lost, and will assure completion in accordance with the contract time.

ARTICLE 4.03 APPROVAL REQUESTS
From time to time, as the work progresses and in the sequence indicated by the approved schedule, the Contractor must submit to the Engineer a specific request, in writing, for each item of information or approval required of him by the Contract. These requests must be submitted sufficiently in advance of the date upon which the information or approval is actually required by the Contractor to allow for the time the Engineer may take to act upon such submissions or resubmissions. The Contractor shall not have any right to an extension of time on account of delays due to his failure to submit his requests for the required information or the required approval in accordance with these requirements.

ARTICLE 4.04 COORDINATION WITH OTHER CONTRACTORS
During progress of the work, other Contractors may be engaged in performing other work on this project or on other projects on the site. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other Contractors in such manner as the Engineer may direct.

ARTICLE 4.05 EXTENSION OF TIME
If such an application is made, the Contractor shall be entitled to an extension of time for delay in completion of the work should the Contractor be obstructed or delayed in the commencement, prosecution or completion of any part of said work by any act or delay of the City, or by acts or omissions of other Contractors on this project, or by a riot, insurrection, war, pestilence, acts of public authorities, fire, lightning, hurricanes, earthquakes, tornadoes, floods, extremely abnormal and excessive inclement weather as indicated by the records of the local weather bureau for a five-year period preceding the date of the Contract, or by strikes, or other causes, which causes of delay mentioned in this Article, in the opinion of the City, are entirely beyond the expectation and control of the Contractor.

The Contractor shall, however, be entitled to an extension of time for such causes only for the number of days of delay which the City may determine to be due solely to such causes and only to the extent that such occurrences actually delay the completion of the project and then only if the Contractor shall have strictly complied with all of the requirements of Articles 4.01, 4.02, 4.03 and 4.04 hereof. It is hereby understood that the determination by the Engineer as to the order and sequence of the work shall not in itself constitute a basis for extension of time.

The determination made by the City on an application for an extension of time shall be binding and conclusive on the Contractor.

Delays caused by failure of the Contractor's materialmen, manufacturers, and dealers to furnish approved working drawings, materials, fixtures, equipment, appliances, or other fittings on time or failure of subcontractors to perform their work shall not constitute a basis of extension of time.

The Contractor agrees to make no claim for damages for delay in the performance of this Contract occasioned by any act or omission to act of the City or any of its representatives or because of any injunction which may be brought against the City or its representatives and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the work as provided herein.

ARTICLE 4.06 LIQUIDATED DAMAGES
It is mutually agreed between the parties that time is the essence of this Contract and that there will be on the part of the City considerable monetary damage in the event the Contractor should fail to complete the work within the time fixed for completion in the Contract or within the time to which such completion may have been extended.

The amount per day set forth in the Instructions to Bidders is hereby agreed upon as the liquidated damages for each and every calendar day that the time consumed in completing the work under this Contract exceeds the time allowed.

This amount shall, in no event, be considered as a penalty or otherwise than as the liquidated and adjusted damages to the City because of the delay and the Contractor and his Surety agree that the stated sum per day for each such day of delay shall be deducted and retained out of the monies which may become due hereunder and if not so deductible, the Contractor and his Surety shall be liable therefor.

ARTICLE 4.07 FINAL INSPECTION
When the work has been completed in accordance with the requirements of the Contract and final cleaning up performed, a date for final inspection of the work by the Engineer shall be set by the Contractor in a written request therefor, which date shall be not less than ten (10) days after the date of such request. The work will be deemed complete as of the date so set by the Contractor if, upon such inspection, the Engineer determines that no further work remains to be done at the site.

If such inspection reveals interms of work still to be performed, however, the Contractor shall promptly perform them and then request a reinspection. If, upon such inspection, the Engineer determines that the work is complete, the date of final completion shall be deemed to be the last day of such reinspection.

SECTION 5
SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 5.01 LIMITATIONS AND CONSENT
The Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract or of his right, title, or interest therein, or his power to execute such Contract, or to assign any monies due or to become due thereunder to any other person, firm or corporation unless the previous written consent of the City shall first be obtained thereto and the giving of any such consent to a particular subcontract or assignment shall not dispense with the necessity of such consent to any further or other assignment.

Before making any subcontract, the Contractor must submit a

written statement to the Engineer, giving the name and address of the proposed contractor, the portion of the work and materials which he is to perform and furnish and any other information tending to prove that the proposed subcontractor has the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and conditions of this Contract.

If the City finds that the proposed subcontractor is qualified, the Contractor will be notified in writing. The City may revoke approval of any subcontractor when such subcontractor evidences an unwillingness or inability to perform his work in strict accordance with these Contract Documents. Notice of such revocation of approval will be given in writing to the Contractor.

The Contractor will promptly, upon request, file with the City a conformed copy of the subcontract. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of these Contract Documents, insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontracts that the City may exercise over the Contractor under provisions of these Contract Documents.

The Contractor shall be required to perform with his own forces at least twenty-five (25) percent of the work, unless written consent to subcontract a greater percentage of the work is first obtained from the City.

ARTICLE 5.02 RESPONSIBILITY
The approval by the City of a subcontractor shall not relieve the Contractor of any of his responsibilities, duties, and liabilities hereunder. The Contractor shall be solely responsible to the City for the acts or defaults or omissions of his subcontractor and of such subcontractor's officers, agents, and employees, each of whom shall for all purposes be deemed to be the agent or employee of the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and the City.

SECTION 6
SECURITY AND GUARANTY

ARTICLE 6.01 CONTRACT SECURITY
The Contractor shall execute and deliver to the City a Performance Bond on the form as provided herein, in an amount at least equal to one hundred (100) percent of the full Contract price, such Bond to be executed by a surety company acceptable to the City. The surety on such Performance Bond shall be a surety company duly authorized to do business in the State of Florida, and the Bond shall be issued or countersigned by a local resident producing agent of such surety company who is a resident of the State of Florida, regularly commissioned and licensed in said State, and satisfactory evidence of the authority of the person or persons executing such Bond shall be submitted with the Bond. The Performance Bond shall serve as security for the faithful performance of this Contract, including maintenance and guaranty provisions, and for the payment of all persons performing labor and furnishing materials in connection with the Contract. The premiums on the Performance Bond shall be paid by the Contractor.

If, at any time, the City shall become dissatisfied with any surety or sureties then upon the Performance Bond, or if for any other reason such bond shall cease to be adequate security for the City, the Contractor shall, within five days after notice so to do, substitute an acceptable Bond in such form and sum and signed by such other sureties as may be satisfactory to the City. The premiums on such Bond shall be paid by the Contractor. No further partial payments shall be deemed due or shall be made until the new sureties have qualified.

ARTICLE 6.02 CONTRACTORS INSURANCE
Insurance required shall be as indicated on Special Instructions pages beginning with "INS-1"

ARTICLE 6.03 AGAINST CLAIMS AND LIENS
The City may withhold from the Contractor as much as any approved payments to him as may, in the opinion of the City, be necessary to secure (a) just claims of any persons supplying labor or materials to the Contractor or any of his subcontractors for the work then due and unpaid; (b) loss due to defective work not remedied, or (c) liability, damage, or loss due to injury to persons or damages to the work or property of other contractors, subcontractors, or others, caused by the act or neglect of the Contractor or of any of his subcontractors. The City shall have the right, as agent for the Contractor, to apply any such amounts so withheld in such manner as the City may deem proper to satisfy such claims or to secure such protection. Such application of such money shall be deemed payments for the account of the Contractor.

ARTICLE 6.04 MAINTENANCE AND GUARANTY
The Contractor hereby guarantees all the work furnished under this Contract against any defects in workmanship and materials for a period of one year following the date of final acceptance of the work by the City. Under this guarantee, the Contractor hereby agrees to make good, without delay, at his own expense, any failure of any part of the work due to faulty materials or manufacture, construction, or installation, or the failure of any equipment to perform satisfactorily all the work put upon it within the limits of the Contract Documents, and further, shall make good any damage to any part of the work caused by such failure. It is hereby agreed that the Performance Bond shall fully cover all guarantees contained in this Article.
It is also agreed that all warranties, expressed or implied, inure to the benefit of the City and are enforceable by the City.

SECTION 7
CHANGES

ARTICLE 7.01 MINOR CHANGES
The City reserves the right to make such additions, deductions, or changes to this Contract from time to time as

it deems necessary and in a manner not materially affecting the substance thereof or materially changing the price to be paid in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed. This Contract shall in no way be invalidated by any such additions, deductions, or changes, and no claim by the Contractor shall be made for any loss of anticipated profits thereby.

Construction conditions may require that minor changes be made in the location and installation of the work and equipment to be furnished and other work to be performed hereunder, and the Contractor when ordered by the Engineer, shall make such adjustments and changes in said locations and work as may be necessary, without additional cost to the City, provided such adjustments and changes do not alter the character, quantity of cost of the work as a whole, and provided further that Plans and Specifications showing such adjustments and changes are furnished to the Contractor by the City within a reasonable time before any work involving such adjustment and changes is begun. The Engineer shall be the sole judge of what constitutes a minor change for which no additional compensation shall be allowed.

ARTICLE 7.02 EXTRA WORK

The City may at any time by a written order and without notice to the sureties require the performance of such extra work as it may find necessary or desirable. An order for extra work shall be valid only if issued in writing and signed by the Mayor and the work so ordered must be performed by the Contractor.

The amount of compensation to be paid to the Contractor for any extra work as so ordered shall be determined as follows:

(a)By such applicable unit prices, if any, as are set forth in the Proposal; or

(b)If no such unit prices are set forth then by a lump sum or other unit prices mutually agreed upon by the City and the Contractor; or

(c)If no such unit prices are set forth in the Proposal and if the parties cannot agree upon a lump sum or other unit prices then by the actual net cost in money to the Contractor of the extra work performed, which cost shall be determined as follows:

(1) For all labor and foreman in direct charge of the authorized operations, the Contractor shall receive the current local rate of wages to be agreed upon, in writing, before starting such work for each hour that said labor and foremen are actually engaged thereon, to which shall be added an amount equal to 25 percent of the sum thereof which shall be considered and accepted as full compensation for general supervision, FICA taxes, contributions under the Florida Unemployment Compensation Act, insurance, bond, subcontractor's profit and overhead, the furnishing of small tools and miscellaneous equipment used, such as picks, shovels, hand pumps, and similar items.

(2) For all materials used, the Contractor shall receive the actual cost of such materials delivered at the site or previously approved delivery point as established by original receipted bills. No percentage shall be added to this cost.

(3) For special equipment and machinery such as power-driven pumps, concrete mixers, trucks, and tractors, or other equipment, required for the economical performance of the authorized work, the Contractor shall receive payment based on the average local area rental price for each item of equipment and the actual time of its use on the work. No percentage shall be added to this sum.

(4) Records of extra work done under this procedure shall be reviewed at the end of each day by the Contractor or his representative and the Engineer. Duplicate copies of accepted records shall be made and signed by both Contractor or his representative and the Engineer, and one copy retained by each.

Request for payment for approved and duly authorized extra work shall be submitted in the same form as Contract work or in the case of work performed under paragraph (c) (1) above upon a certified statement supported by receipted bills. Such statement shall be submitted for the current Contract payment for the month in which the work was done.

ARTICLE 7.03 DISPUTED WORK

If the Contractor is of the opinion that any work required, necessitated, or ordered violates the terms and provisions of this Contract, he must promptly notify the Engineer, in writing, of his contentions with respect thereto and request a final determination thereof. If the Engineer determines that the work in question is Contract work and not extra work or that the order complained of is proper, he will direct the Contractor to proceed and the Contractor shall promptly comply. In order, however, to reserve his right to claim compensation for such work or damages resulting from such compliance, the Contractor must, within five (5) days after receiving notice of the Engineer's determination and direction, notify the City in writing that the work is being performed or that the determination and direction is being complied with under protest. Failure of the Contractor to notify shall be deemed as a waiver of claim for extra compensation or damages therefor.

Before final acceptance by the City, all matters of dispute must be adjusted to the mutual satisfaction of the parties thereto. Final determinations and decisions, in case any questions shall arise, shall constitute a condition precedent to the right of the Contractor to receive the money therefor until the matter in question has been adjusted.

ARTICLE 7.04 OMITTED WORK

The City may at any time by a written order and without notice to the sureties require the omission of such Contract work as it may find necessary or desirable.

An order for omission of work shall be valid only if signed by the Mayor and the work so ordered must be omitted by the Contractor. The amount by which the Contract price shall be reduced shall be determined as follows:

(a) By such applicable unit prices, if any, as are set forth in the Contract; or

(b) By the appropriate lump sum price set forth in the Contract; or

(c) By the fair and reasonable estimated cost to the City

of such omitted work as determined by the Engineer and approved by the City.

SECTION 8
CONTRACTOR'S EMPLOYEES

ARTICLE 8.01 CHARACTER AND COMPETENCY
The Contractor and his subcontractors shall employ upon all parts of the work herein contracted for only competent, skillful, and trustworthy workers. Should the Engineer at any time give notice, in writing, to the Contractor or his duly authorized representative on the work that any employee in his opinion is incompetent, unfaithful, disorderly, careless, unobservant of instructions, or in any way a detriment to the satisfactory progress of the work, such employee shall immediately be dismissed and not again allowed upon the site.

ARTICLE 8.02 SUPERINTENDENCE
The Contractor shall give his personal supervision to the faithful prosecution of the work and in case of his absence shall have a competent, experienced, and reliable supervisor or superintendent, acceptable to the Engineer on the site who shall follow without delay all instructions of the Engineer in the prosecution and completion of the work and every part thereof, in full authority to supply workers, material, and equipment immediately. He shall keep on hand at all times copies of the Contract Documents.

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES
The Contractor shall, in the performance of the work required to be done under this Contract, employ all workers without discrimination regarding race, creed, color, sex or national origin and must not maintain or provide facilities that are segregated on the basis of race, color, creed or national origin.

ARTICLE 8.04 RATES OF WAGES
On federally assisted projects, the rates of wages to be paid under this Contract shall not be less than the rates of wages set forth in Section 12 of this Agreement.

On other projects, no wage rate determination is included. Florida's Prevailing Wage Law (Section 215.19, Florida Statutes) was repealed effective April 25, 1979.

ARTICLE 8.05 PAYROLL REPORTS
The Contractor and each subcontractor shall, if requested to do so, furnish to the Engineer a duly certified copy of his payroll and also any other information required by the Engineer to satisfy him that the provisions of the law as to the hours of employment and rate of wages are being observed.

Payrolls shall be prepared in accordance with instructions furnished by the City and on approved forms. The Contractor shall not carry on his payroll any persons not employed by him. Subcontractor's employees shall be carried only on the payrolls of the employing subcontractor.

SECTION 9
CONTRACTOR'S DEFAULT

ARTICLE 9.01 CITY'S RIGHT AND NOTICE
It is mutually agreed that: (a) if the Contractor fails to begin work when required to do so, or (b) if at any time during the progress of the work it shall appear to the Engineer that the Contractor is not prosecuting the work with reasonable speed, or is delaying the work unreasonably and unnecessarily, or (c) if the force of workmen or quality or quantity of material furnished are not sufficient to insure completion of the work within the specified time and in accordance with the Specifications hereto attached, or (d) if the Contractor shall fail to make prompt payments for materials or labor or to subcontractors for work performed under the Contract, or (e) if legal proceedings have been instituted by others than the City in such manner as to interfere with the progress of the work and may subject the City to peril of litigation or outside claims of (f) if the Contractor shall be adjudged a bankrupt or make an assignment for the benefit of creditors, or (g) if in any proceeding instituted by or against the Contractor an order shall be made or entered granting an extension of time of payment, composition, adjustment, modification, settlement or satisfaction of his debts or liabilities, or (h) if a receiver or trustee shall be appointed for the Contractor or the Contractor's property, or (i) if the Contract or any part thereof shall be sublet without the consent of the City being first obtained in writing, or (j) if this Contract or any right, monies, or claim thereunder shall be assigned by the Contractor, otherwise than as herein specified, or (k) if the Contractor shall fail in any manner of substance to observe the provisions of this Contract, or (l) if any of the work, machinery, or equipment shall be defective, and shall not be replaced as herein provided, or (m) if the work to be done under this Contract shall be abandoned, then such fact or conditions shall be certified by the Engineer and thereupon the City without prejudice to any other rights or remedies of the City, shall have the right to declare the Contractor in default and so notify the Contractor by a written notice, setting forth the ground or grounds upon which such default is declared and the Contractor must discontinue the work, either as a portion of the work or the whole thereof, as directed.

ARTICLE 9.02 CONTRACTOR'S DUTY UPON DEFAULT
Upon receipt of notice that his Contract is in default, the Contractor shall immediately discontinue all further operations on the work or such part thereof, and shall immediately quit the site or such part thereof, leaving untouched all plant, materials, equipment, tools, and supplies.

ARTICLE 9.03 COMPLETION OF DEFAULTED WORK
The City, after declaring the Contractor in default, may then have the work completed or the defective equipment or machinery replaced or anything else done to complete the work in strict accordance with the Contract Documents by such means and in such manner, by Contract with or without public letting, or otherwise, as it may deem advisable,

utilizing for such purpose without additional cost to the City such of the Contractor's plant, materials, equipment, tools, and supplies remaining on the site, and also such subcontractors as it may deem advisable.

The City shall reimburse all parties, including itself, for the expense of such completion, including liquidated damages, if any, and the cost of reletting. The City shall deduct this expense from monies due or to become due to the Contractor under this Contract, or any part thereof, and in case such expense is more than the sum remaining unpaid of the original contract price, the Contractor and his sureties shall pay the amount of such deficiency to the City.

ARTICLE 9.04 PARTIAL DEFAULT
In case the City shall declare the Contractor in default as to a part of the work only, the Contractor shall discontinue such part, shall continue performing the remainder of the work in strict conformity with the terms of the Contract, and shall in no way hinder or interfere with any other contractor or person whom the City may engage to complete the work as to which the Contractor was declared in default.

SECTION 10
PAYMENTS

ARTICLE 10.01 PRICES
For the Contractor's complete performance of the work, the City will pay and the Contractor agrees to accept, subject to the terms and conditions hereof, the lump sum prices or unit prices in the Contractor's Proposal and the award made therein, plus the amount required to be paid for any extra work ordered under Article 7.02 hereof, less credit for any work omitted pursuant to Article 7.04 hereof. Under unit price items, the number of units actually required to complete the work under the Contract may be more than stated in the Proposal. The Contractor agrees that no claim will be made for any damages or for loss of profits because of a difference between the quantities of the various classes of work assumed and stated in the Proposal Form as a basis for comparing Proposals and the quantities of work actually performed.

The sum as awarded for any lump sum Contract or lump sum Contract Item shall represent payment in full for all of the various classes of work, including materials, equipment, and labor necessary or required to complete, in conformity with the Contract Document, the entire work shown, indicated or specified under the lump sum Contract or lump sum Contract Item.

The amount as awarded as a unit price for any unit price Contact Item shall represent payment in full for all the materials, equipment, and labor necessary to complete, in conformity with the Contract Documents, each unit of work shown, specified, or required under the said unit price Contract Item.

No payment other than the amount as awarded will be made for any class of work included in a lump sum Contract Item or a unit price Contract Item, unless specific provision is made therefor in the Contract Documents.

ARTICLE 10.02 SUBMISSION OF BID BREAKDOWN
Within fifteen (15) days after the execution of this Contract, the Contractor must submit to the Engineer in duplicate an acceptable breakdown of the lump sums and unit prices bid for items of the Contract, showing the various operations to be performed under the Contract, as described in the progress schedule required under Article 4.02 hereof, and the value of each of such operations, the total of such items to equal the total price bid. The Contractor shall also submit such other information relating to the bid prices as may be required and shall revise the bid breakdown as directed. Thereafter, the breakdown may be used for checking the Contractor's applications for partial payments hereunder but shall not be binding upon the City or the Engineer for any purpose whatsoever.

ARTICLE 10.03 REPORTS, RECORDS AND DATA
The Contractor shall furnish to the Engineer such schedules of quantities and costs, progress schedules, reports, invoices, delivery tickets, estimates, records, and other data as the Engineer may request concerning work performed or to be performed and the materials furnished under the Contract.

ARTICLE 10.04 PAYMENTS BY CONTRACTOR
The Contractor shall pay (a) for all transportation and utility services not later than the 20th day of the calendar month following that in which such services are rendered, (b) for all materials, tools, and equipment delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools, and equipment are incorporated or used, and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors, to the extent of each subcontractor's interest therein; and proof of such payments or releases therefor shall be submitted to the Engineer upon request.

ARTICLE 10.05 PARTIAL PAYMENTS
On or about the first of each month, the Contractor shall make and certify an estimate, on forms prescribed by the City, of the amount and fair value of the work done, and may apply for partial payment therefor. The Contractor shall revise the estimate as the Engineer may direct. When satisfactory progress has been made, and shows that the value of the work completed since the last payment exceeds one percent (1%) of the total Contract price in amount, the Engineer will issue a certificate that such work has been completed and the value thereof. The City will then issue a voucher to the Contractor in accordance with the following schedule:

FOR CONTRACT AMOUNTS UNDER $250,000
(A)In the amount of ninety percent (90%) of the value of the work completed as certified until construction is one hundred percent (100%) complete (operational or beneficial occupancy), the withheld amount may be reduced below ten percent (10%), at the Engineer's option, to only that amount necessary to assure completion.

FOR CONTRACT AMOUNTS OVER $250,000

(A)In the amount of ninety percent (90%) of the value of the work completed as certified until construction is fifty percent (50%) complete.

(B)When the dollar value, as determined by the Engineer, of satisfactorily completed work in place is greater than fifty percent (50%) of the original contract price, vouchers for partial payment will be issued by the City to the Contractor in the amount of one hundred percent (100%) of the value of the work, above 50%, completed as certified for that payment period.

(C)If the Contractor has performed satisfactorily and the work is substantially complete (operational or beneficial occupancy) the withheld amount may be reduced, at the Engineer's option, to only that amount necessary to assure completion.

In addition to the Conditions set forth in (A), (B), and (C) above, payments will always be less any sums that may be retained or deducted by the City under the terms of any of the contract documents and less any sums that may be retained to cover monetary guarantees for equipment, materials or progress performance.

Payment on estimates made on or about the first of the month may be expected on or about the 20th of the month.

Unless specified otherwise in the Contract Items, the delivered cost of equipment and nonperishable materials suitably stored at the site of the work and tested for adequacy may be included in the Contractor's application for partial payment provided, however, that the Contractor shall furnish evidence satisfactory to the City that the Contractor is the unconditional owner and in possession of such materials or equipment. The amount to be paid will be 90 percent of the invoice cost to the Contractor which cost shall be supported by receipted bills within 30 days of the date of payment by the City to the Contractor. Such payment shall not relieve the Contractor from full responsibility for completion of the work and for protection of such materials and equipment until incorporated in the work in a permanent manner as required by the Contract Documents.

Before any payment will be made under this Contract, the Contractor and every subcontractor, if required, shall deliver to the Engineer a written, verified statement, in satisfactory form, showing in detail all amounts then due and unpaid by such Contractor or subcontractor to all laborers, workmen, and mechanics, employed by him under the Contract for the performance of the work at the site thereof, for daily or weekly wages, or to other persons for materials, equipment, or supplies delivered at the site of the work during the period covered by the payment under consideration.

ARTICLE 10.06 FINAL PAYMENT

Under determination of satisfactory completion of the work under this Contract as provided in Article 4.07 hereof, the Engineer will prepare the final estimate showing the value of the completed work. This estimate will be prepared within 30 days after the date of completion or as soon thereafter as the necessary measurements and computations can be made. All prior certificates and estimates, being approximate only, are subject to correction in the final estimate and payment.

When the final estimate has been prepared and certified by Engineer, he will submit to the Mayor and City Council the final certificate stating that the work has been completed and the amount based on the final estimate remaining due to the Contractor. The City will then accept the work as fully completed and will, not later than 30 days after the final acceptance, as defined in Article 1.02, of the work done under this Contract, pay the Contractor the entire amount so found due thereunder after deduction of all previous payments and all percentages and amounts to be kept and retained under provisions of this Contract; provided, however, and it is understood and agreed that, as a precedent to receiving final payment, the Contractor shall submit to the City a sworn affidavit that all bills for labor, service, materials, and subcontractors have been paid and that there are no suits pending in connection with this work. The City, at its option, may permit the Contractor to execute a separate surety bond in a form satisfactory to the City. The surety bond shall be in the full amount of the suit or suits.

Neither the final payment nor any part of the retained percentage shall be paid until the Contractor, if required, shall furnish the City with a complete release from any should remain unsatisfied after all payments are made, the Contractor shall refund to the City all monies which the City may be compelled to pay in discharging such claim, including incidental costs and attorney's fees.

ARTICLE 10.07 ACCEPTANCE OF FINAL PAYMENT

The acceptance by the Contractor, or by anyone claiming by or through him, of the final payment shall operate as and shall be a release to the City and every officer and agent thereof from any and all claims and liability to the Contractor for anything done or furnished in connection with the work or project and for any act or neglect of the Contractor or of any others relating to or affecting the work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or the Performance Bond.

SECTION 11
MISCELLANEOUS PROVISIONS

ARTICLE 11.01 CONTRACTOR'S WARRANTIES

In consideration of, and to induce the award of this contract to him, the Contractor represents and warrants:

(a)That he is not in arrears to the City upon debt or contract, and he is not a defaulter, as surety, contractor, or otherwise.

(b)That he is financially solvent and sufficiently experienced and competent to perform the work.

(c)That the work can be performed as called for by the Contract Documents.

(d)That the facts stated in his proposal and the information given by him are true and correct in all respects.

(e)That he is fully informed regarding all the conditions affecting the work to be done and labor and materials to be

furnished for the completion of this Contract, and that his information was secured by personal investigation and research.

ARTICLE 11.02 PATENTED DEVICES, MATERIAL AND PROCESSES

It is mutually understood and agreed that Contract prices include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work. Whenever the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall indemnify and save harmless the City, its officers, agents and employees from any and all claims for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process, to be performed under the Contract, and shall indemnify the said City, its officers, agents, and employees for any costs, expenses, and damages which may be incurred by reason of such infringement at any time during the prosecution or after completion of the work.

ARTICLE 11.03 SUITS AT LAW

In case any action at law or suit in equity may or shall be brought against the City or any of its officers, agents, or employees for or on account of the failure, omission, or neglect of the Contractor or his subcontractors, employees, or agents, to do or perform any of the covenants, acts, matters, or things by this Contract undertaken to be done or performed by the Contractor of his subcontractors, employees, or agents, or from any injuries done to property or persons and caused by the negligence or alleged negligence of the Contractor of his subcontractors, employees, or agents, or in any other manner arising out of the performance of this Contract, then the Contractor shall immediately assume and take charge of the defense of such actions or suits in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor, and the Contractor shall also indemnity and save harmless the City, its officers, agents, and employees from any and all loss, cost or damage whatever arising out of such actions or suits, in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor.

The Contractor shall and does hereby assume all liability for and agrees to indemnify the City or its Engineer against any or all loss, costs, damages, and liability for any or by reason of any lien, claims or demands, either for materials purchased or for work performed by laborers, mechanics, and others and from any damages, costs, actions, or causes of action and judgement arising from injuries sustained by mechanics, laborers, or other persons by reason of accidents or otherwise, whether caused by the carelessness or inefficiency or neglect of said Contractor, his subcontractors, agents, employees, workmen or otherwise.

ARTICLE 11.04 CLAIMS FOR DAMAGES

If the Contractor shall claim compensation for any damage sustained, other than for extra or disputed work covered by Article 7.02 and 7.03 hereof, by reason of any act or omission of the City, its agents, or any persons, he shall, within five days after sustaining such damage, make and deliver to the Engineer a written statement of the nature of the damage sustained and of the basis of the claim against the City. On or before the 15th of the month succeeding that in which any damage shall have been sustained, the Contractor shall make and deliver to the Engineer an itemized statement of the details and amounts of such damage, duly verified by the Contractor. Unless such statements shall be made delivered within the times aforesaid, it is stipulated that and all claims for such compensation shall be forfeited and invalidated, and the Contractor shall not be entitled to payment on account of such claims.

ARTICLE 11.05 NO CLAIMS AGAINST INDIVIDUALS

No claim whatsoever shall be made by the Contractor against any officer, agent, employee of the City for, or on account of, anything done or omitted to be done in connection with this Contract.

ARTICLE 11.06 LIABILITY UNAFFECTED

Nothing herein contained shall in any manner create any liability against the City on behalf of any claim for labor, services, or materials, or of subcontractors, and nothing herein contained shall affect the liability of the Contractor or his sureties to the City or to any workmen or materialsmen upon bond given in connection with this Contract.

ARTICLE 11.07 INDEMNIFICATION PROVISIONS

Whenever there appears in this Agreement, or in the other Contact Documents made a part hereof, an indemnification provision within the purview of Chapter 725.06, Laws of Florida, the monetary limitation on the extent of the indemnification under each such provision shall be One Million Dollars or a sum equal to the total Contract price, whichever shall be the greater.

ARTICLE 11.08 UNLAWFUL PROVISIONS DEEMED STRICKEN

If this contract contains any unlawful provisions not an essential part of the Contract and which shall not appear to have a controlling or material inducement to the making thereof, such provisions shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the Contract without affecting the binding force of the remainder.

ARTICLE 11.09 LEGAL PROVISIONS DEEMED INCLUDED

Each and every provision of any law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein and if, through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon application of either party the Contract shall forthwith be physically amended to make such insertion.

ARTICLE 11.10 DEATH OR INCOMPETENCY OF CONTRACTOR

In the event of death or legal incompetency of a Contractor who shall be an individual or surviving member of a contracting firm, such death or adjudication of incompetency

shall not terminate the Contract, but shall act as default hereunder to the effect provided in Article 9.01 hereof and the estate of the Contractor and his surety shall remain liable hereunder to the same extent as though the Contractor had lived. Notice of default, as provided in Article 9.01 hereof, shall not be required to be given in the event of such death or adjudication of incompetency.

ARTICLE 11.11 NUMBER AND GENDER OF WORDS

Whenever the context so admits or requires, all references herein in one number shall be deemed extended to and including the other number, whether singular or plural, and the use of any gender shall be applicable to all genders.

ARTICLE 11.12 ACCESS TO RECORDS

Representatives of Federal Agencies, if applicable, and the State of Florida shall have access to the work whenever it is in preparation of progress. On federally assisted projects the Federal Agency, the Comptroller General of the United States, or any authorized representative shall have access to any books, documents, papers, and records of the Contractor which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcription thereof.

SECTION 12
LABOR STANDARDS

ARTICLE 12.01 LABOR STANDARDS

The Contractor shall comply with all of the regulations set forth in "Labor Standards Provisions for Federally Assisted Construction Contracts", which may be attached, and any applicable Florida Statutes.

ARTICLE 12.02 NOTICE TO LABOR UNIONS

If required, the Contractor shall provide Labor Unions and other organizations of workers, and shall post, in a conspicuous place available to employees or applicants for employment, a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers" attached to and made a part of this Agreement.

ARTICLE 12.03 SAFETY AND HEALTH REGULATIONS

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). Nothing in these Acts shall be construed to supersede or in any manner affect any worker's compensation law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment.

ARTICLE 12.04 EEO AFFIRMATIVE ACTION REQUIREMENTS

The Contractor understands and agrees to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under this Contract. The Contractor also agrees to similarly bind contractually each subcontractor. In policies, the Contractor agrees to engage in Affirmative Action directed at promoting and ensuring equal employment opportunity in the work force used under the Contract (and the Contractor agrees to require contractually the same effort of all subcontractors whose subcontractors exceed $100,000). The Contractor understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the Contract.

ARTICLE 12.05 PREVAILING RATES OF WAGES

Florida's prevailing wage law was repealed effective April 25, 1979.

For Federally assisted projects, appropriate prevailing wage rate determinations are indicated on pages beginning with WR-1.

* * * * * * *

IN WITNESS THEREOF, the parties have hereunto set their hands and seals, and such of them as are corporation have caused these present to be signed by their duly authorized officers.

CITY OF TAMPA, FLORIDA

_____
Bob Buckhorn, Mayor
(SEAL)

ATTEST:

_____
City Clerk

Approved as to Form:
The execution of this document was authorized by Resolution No. _____

_____
Rachel S. Peterkin, Assistant City Attorney

Contractor

By:_____
(SEAL)

Title:

ATTEST:

_____
Witness

STATE OF)
) SS:
COUNTY OF)

For a Corporation:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 20___ by _____ of _____, a _____ corporation, on behalf of the corporation. He/she is ___ personally known or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

For an Individual:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 20___ by _____ who is ___ personally known to me or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

For a Firm:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ___ of _____, 20___ by _____ who signed on behalf of the said firm. He/she is ___ personally known or has ___ produced _____ as identification.

_____
Notary

My Commission Expires:

_____

_____

PUBLIC CONSTRUCTION BOND

Bond No. (enter bond number)_____

Name of Contractor:_____

Principal Business Address of Contractor:_____

_____

Telephone Number of Contractor:_____

Name of Surety (if more than one list each):_____

_____

Principal Business Address of Surety:_____

_____

Telephone Number of Surety:_____

Owner is The City of Tampa, Florida

Principal Business Address of Owner: 306 E Jackson St, Tampa, FL 33602

Contract Administration Department (280A4N)

Telephone Number of Owner: 813/274-8456

Contract Number Assigned by City to contract which is the subject of this bond:_____

Legal Description or Address of Property Improved or Contract Number is:_____

_____

_____

_____

General Description of Work and Services:_____

_____

_____

_____

KNOW ALL MEN BY THESE PRESENTS That we, _____

_____
(Name of Contractor)

as Principal, hereinafter called CONTRACTOR, of the State of _____, and

_____(Name of Surety)
a corporation organized and existing under and by virtue of the laws of the State of _____, and regularly authorized to do business in the State of Florida, as SURETY, are held and firmly bound unto the City of Tampa, a municipal corporation organized and existing under the laws of the State of Florida, hereinafter called Owner, in the penal sum of _____Dollars and _____Cents ($_____), lawful money of the United States of America, for the payment whereof well and truly to be made, we bind ourselves, our heirs, executors, and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the contract dated _____, _____, 20___, between Principal and Owner for construction of _____, the contract being made a part of this bond by reference, in the time and in the manner prescribed in the contract; and

2. Promptly makes payments to all claimants, as defined in Section 255.05(1) (Section 713.01), Florida Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the work provided for in the contract; and

3. Pays Owner all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that Owner sustains because of a default by Principal under the contract; and

4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.

5. Contractor and Surety acknowledge that the Work for which this bond has been issued may be one of several such contract documents for a group of projects. This bond does not secure covenants to pay for or to perform design services survey or program management services. The Owner/Obligee is expected to reasonably account for damages that are caused to Owner with respect to Principal's (Contractor's) default in performance of the scope of the Work incorporated by reference into the bond, and notwithstanding any contractual or common law remedy permitted to Owner as against Contractor, the obligation of Surety for any damages under this bond shall be determined by the cost of completion of the Work less the contract balance unpaid upon default of Contractor for the Work plus liquidated damages at the rate of $500.00 per day for delays by the Contractor and/or Surety in reaching substantial completion.

6. The notice requirements for claimants and conditions for entitlement to payment set forth in Section 255.05, Fla. Stat. and the limitations period to actions upon Section 255.05, Fla. Stat. bonds apply to claimants seeking payment from surety under this bond. Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05, Florida Statutes.

7. The Surety, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the contract documents or other Work to be performed hereunder, or the specifications referred to therein shall in any way affect its obligations under this bond, and it does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to Work or to the specifications.

8. The above SURETY states that it has read all of the Contract Documents made by the CONTRACTOR with the CITY, hereto attached, and the terms and conditions of the contract and work, and is familiar therewith and in particular those portions of the Agreement concerning the guaranty of such CONTRACTOR for a period of one year following the date of the final acceptance of the completed work under the Contract by the CITY, all of which this BOND includes.

DATED ON _____, 20___

_____
(Name of Principal)

_____
(Principal Business Address)

By _____

Title _____

_____
Telephone Number of Principal

_____
(Name of Surety)

_____
(Surety Address)

By _____
(As Attorney in Fact)*

_____
Telephone Number of Surety

Approved as to legal sufficiency:

By _____
Assistant City Attorney

Countersignature:

_____
(Name of Local Agency)

_____
(Address of Resident Agent)

By _____

Title _____

_____
Telephone Number of Local Agency

*(As Attorney in Fact) attach Power of Attorney and Current Certificate with Original Signature

SPECIFICATIONS
GENERAL PROVISIONS

SECTION 1
SCOPE AND INTENT

G-1.01 DESCRIPTION
The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.

G-1.02 WORK INCLUDED
The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Provisions, for which there are no specific Contract Items, shall be considered as part of the overhead cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made therefor.

The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his plant and equipment, prior approval of the Engineer notwithstanding.

G-1.03 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES
Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes, and all other appurtenances and facilities pertaining thereto whether owned or controlled by the City, other governmental bodies or privately owned by individuals, firms, or corporations, and used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work.

The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.

The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the Engineer. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Plans or have been located in the field by the utility shall be repaired by the Contractor, at his expense, as directed by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the City or other governmental body which are shown on the Plans to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefor.

Where public utility installations or structures owned or controlled by the City or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction or such work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided for in Article 7.02 of the Agreement.

The Contractor shall, at all times in performance of the work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of public utility installations and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.

All City and other governmental utility departments and other owners of public utilities, which may be affected by the work, will be informed in writing by the Engineer within two weeks after the execution of the Contract or Contracts covering the work. Such notice will set out, in general, and direct attention to, the responsibilities of the City and other governmental

utility departments and other owners of public utilities for such installations and structures as may be affected by the work and will be accompanied by one set of Plans and Specifications covering the work under such Contract or Contracts.

In addition to the general notice given by the Engineer, the Contractor shall give written notice to all City and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight (48) hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Underground Utility Notification Center for Excavators (Call Candy)".

The maintenance, repair, removal, relocation, or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the Engineer.

SECTION 2
PLANS AND SPECIFICATIONS

G-2.01 PLANS
The Plans referred to in the Contract Documents bear the general project name and number as shown in the Notice To Bidders.

When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large scale drawings in preference to small scale drawings.

G-2.02 COPIES FURNISHED TO CONTRACTOR
After the Contract has been executed, the Contractor will be furnished with five sets of paper prints, the same size as the original drawings, of each sheet of the Plans and five copies of the Specifications. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

The Contractor shall furnish each of the subcontractors, manufacturers, and material suppliers such copies of the Contract Documents as may be required for his work.

G-2.03 SUPPLEMENTARY DRAWINGS
When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer and five paper prints thereof will be given to the Contractor.

The Supplementary Drawings shall be binding upon the Contractor with the same force as the Plans. Where such Supplementary Drawings require either less or more than the estimated quantities of work, credit to the City or compensation therefor to the Contractor shall be subject to the terms of the Agreement.

G-2.04 CONTRACTOR TO CHECK PLANS AND DATA
The Contractor shall verify all dimensions, quantities, and details shown on the Plans, Supplementary Drawings, Schedules, Specifications, or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions as full instructions will be furnished by the Engineer, should such errors or omissions be discovered. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

G-2.05 SPECIFICATIONS
The specifications consist of four parts, the General Provisions, the Technical Specifications, the Special Provisions and the Contract Items. The General Provisions and Technical Specifications contain general requirements which govern the work. The Special Provisions and the Contract Items modify and supplement these by detailed requirements for the work and shall always govern, whenever there appears to be conflict.

G-2.06 INTENT
All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

SECTION 3
WORKING DRAWINGS

G-3.01 SCOPE
The Contractor shall promptly prepare and submit layout, detail and shop drawings to insure proper construction, assembly, and installation of the work using those materials and methods as hereafter specified under the Technical Specifications, Special Provisions and Contract Items.

These drawings shall accurately and distinctly present the following:

a. All working and erection dimensions.
b. Arrangements and sectional views.
c. Necessary details, including complete information for making connections between work under this Contract and work under other Contracts.
d. Kinds of materials and finishes.
e. Parts listed and description thereof.

Drawings for mechanical equipment shall present, where applicable, such data as dimensions, weight and performance characteristics. These data shall show conformance with the performance characteristics and other criteria incorporated in the Plans and Specifications.

Each drawing shall be dated and shall contain the name of the project, Division number and description, the technical specifications section number, names of equipment or materials and the location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material. The Engineer will return unchecked any submittal which does not contain complete data on the work and full information on related matters.

Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.

The Contractor shall review all working drawing submittals before transmitting them to the Engineer to determine that they comply with requirements of the Specifications. Drawings which are incomplete or are not in compliance with the Contract Documents shall not be submitted for processing by the Engineer. The Contractor shall place his stamp of approval on all working drawings submitted to the Engineer to indicate compliance with the above.

G-3.02 APPROVAL
If the working drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of submittal; otherwise approval of such submittals shall not constitute approval of the departure. Approval of the drawings shall constitute approval of the subject matter thereof only and not of any structure, material, equipment, or apparatus shown or indicated.

The approval of drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract and not indicated on the drawings. No work called for by working drawings shall be done until such drawings have been approved by the Engineer.

The procedure in seeking approval of the working drawings shall be as follows:

1.The Contractor shall submit four complete sets of drawings and other descriptive data together with one copy of a letter of transmittal to the Engineer for approval. The letter of transmittal shall contain the name of the project, contract number, technical specifications section number, the name of the Contractor, a list of drawings with numbers and titles, and any other pertinent information.

2.Drawings or descriptive data will be stamped "Approved", "Approved Subject to Corrections Marked", or "Examined and Returned for Correction" and one copy with a letter of transmittal will be returned to the Contractor.

3.If a drawing or other data is stamped "Approved", the Contractor shall insert the date of approval on five additional copies of the document and transmit the five copies to the Engineer together with one copy of a letter of transmittal containing substantially the same information as described in Instruction 1. above.

4.If a drawing or other data is stamped "Approved Subject to Corrections Marked", the Contractor shall make the corrections indicated and proceed as in Instruction 3., above.

5.If a drawing or data is stamped "Examined and Returned for Correction", the Contractor shall make the necessary corrections and resubmit the documents as set forth in Instruction 1., above. The letter of transmittal shall indicate that this is a resubmittal.

The Contractor shall revise and resubmit the working drawings as required by the Engineer, until approval thereof is obtained.

SECTION 4
MATERIALS AND EQUIPMENT

G-4.01 GENERAL REQUIREMENTS
All materials, appliances, and types or methods of construction shall be in accordance with the Specifications and shall, in no event, be less than that necessary to conform to the requirements of any applicable laws, ordinances, and codes.

All materials and equipment shall be new, unused, and correctly designed. They shall be of standard first grade quality, produced by expert personnel, and intended for the use for which they are offered. Materials or equipment which, in the opinion of the Engineer, are inferior or of a lower grade than indicated, specified, or required will not be accepted.

The quality of Workmanship and Materials entering into the work under this Contract shall conform to the requirements of the pertinent sections, clauses, paragraphs, and sentences, both directly and indirectly applicable thereto, of that part of the Technical Specifications, whether or not direct reference to such occurs in the Contract Items.

Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA and other

generally accepted standards and shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, and the like, shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.

Equipment shall be of the approximate dimensions as indicated on the Plans or as specified, shall fit the spaces shown on the Plans with adequate clearances, and shall be capable of being handled through openings provided in the structure for this purpose. The equipment shall be of such design that piping and electrical connections, ductwork, and auxiliary equipment can be assembled and installed without causing major revisions to the location or arrangement of any of the facilities.

Machinery parts shall conform exactly to the dimensions shown on the working drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable. All grease lubricating fittings on equipment shall be of a uniform type. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI and applicable state and local codes.

G-4.02 MANUFACTURER

The names of proposed manufacturers, suppliers, material, and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the Engineer for approval, as early as possible, to afford proper investigation and checking. Such approval must be obtained before shop drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless he shall be of good reputation and have a plant of ample capacity. He shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.

G-4.03 REFERENCE TO STANDARDS

Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the date of advertisement for proposals, even though reference has been made to an earlier standard, and such standards are made a part hereof to the extent which is indicated or intended.

Reference to a technical society, organization or body may be made in the Specifications by abbreviations, in accordance with the following list:

AASHTO for American Association of State Highway and Transportation Officials (formerly AASHO)
ACI for American Concrete Institute
AGMA for American Gear Manufacturer's Association
AFBMA for Anti-Friction Bearing Manufacturer's Association
AISC for American Institute of Steel Construction
AISI for American Iron and Steel Institute
ANSI for American National Standards Institute
ASCE for American Society of Civil Engineers
ASTM for American Society for Testing and Materials
ASME for American Society of Mechanical Engineers
AWS for American Welding Society
AWWA for American Water Works Association
AWPA for American Wood Preservers Association
CEMA for Conveyor Equipment Manufacturers Association
CIPRA for Cast Iron Pipe Research Association
IEEE for Institute of Electrical and Electronic Engineers
IPCEA for Insulated Power Cable Engineers Association
NEC for National Electrical Code
NEMA for National Electrical Manufacturers Association
SAE for Society of Automotive Engineers
SHBI for Steel Heating Boiler Institute
Fed.Spec. for Federal Specifications
Navy Spec. for Navy Department Specifications
U.L.,Inc. for Underwriters' Laboratories, Inc.

When no reference is made to a code, standard or specification, the Standard Specifications of the ANSI, the ASME, the ASTM, the IEEE, or the NEMA shall govern.

G-4.04 SAMPLES

The Contractor shall, when required, submit to the Engineer for approval typical samples of materials and equipment. The samples shall be properly identified by tags and shall be submitted sufficiently in advance of the time when they are to be incorporated into the work, so that rejections thereof will not cause delay. A letter of transmittal, in duplicate, from the Contractor requesting approval must accompany all such samples.

G-4.05 EQUIVALENT QUALITY

Whenever, in the Contract Documents, an article, material, apparatus, equipment, or process is called for by trade name or by the name of a patentee, manufacturer, or dealer or by reference to catalogs of a manufacturer or dealer, it shall be understood as intending to mean and specify the article, material, apparatus, equipment or process designated, or any

equal thereto in quality, finish, design, efficiency, and durability and equally serviceable for the purposes for which it is intended.

Whenever material or equipment is submitted for approval as being equal to that specified, the decision as to whether or not such material or equipment is equal to that specified shall be made by the Engineer.

Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Contract, the Contractor shall immediately proceed to furnish the designated material or equipment.

Neither the approval by the Engineer of alternate material or equipment as being equivalent to that specified nor the furnishing of the material or equipment specified, shall in any way relieve the Contractor of responsibility for failure of the material or equipment, due to faulty design, material, or workmanship, to perform the functions required of them by the Specifications.

G-4.06 DELIVERY
The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete thw work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid a delay in, or impediment of, the progress of the work of any related Contractor.

G-4.07 CARE AND PROTECTION
The Contractor shall be solely responsible for properly storing and protecting all materials, equipment, and work furnished under the Contract from the time such materials and equipment are delivered at the site of the work until final acceptance thereof. He shall, at all times, take necessary precautions to prevent injury or damage by water, freezing, or by inclemencies of the weather to such materials, equipment and work. All injury or damage to materials, equipment, or work resulting from any cause whatsoever shall be made good by the Contractor.

The Engineer shall, in all cases, determine the portion of the site to be used by the Contractor for storage, plant or for other purposes. If, however, it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the work or interference with the work to be done by any other Contractor, the Contractor shall remove and restack such materials at his own expense.

G-4.08 TOOLS AND ACCESSORIES
The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

G-4.09 INSTALLATION OF EQUIPMENT
The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the Engineer during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the Engineer and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall, at his own expense, furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations. Grout shall completely fill the space between the equipment base and the foundation.

G-4.10 OPERATING INSTRUCTIONS
The Contractor, through qualified individuals, shall adequately instruct designated employees of the City in the operation and care of all equipment installed hereunder, except for equipment that may be furnished by the City.

The Contractor shall also furnish and deliver to the Engineer three complete sets for permanent files, identified in accordance with Subsection G-3.01 hereof, of instructions, technical bulletins and any other printed matter, such as diagrams, prints or drawings, containing full information required for the proper operation, maintenance, and repair, of the equipment installed and the ordering of spare parts, except for equipment that may be furnished by the City.

In addition to the above three copies, the Contractor shall furnish any additional copies that may be required for use during construction and start-up operations.

G-4.11 SERVICE OF MANUFACTURER'S ENGINEER
The Contract prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in

permanent operation by the City, such engineer or superintendent shall make all adjustments and tests required by the Engineer to provide that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the City in the proper operation and maintenance of such equipment.

SECTION 5
INSPECTION AND TESTING

G-5.01 GENERAL
The Contractor's attention is hereby directed to Article 3.03 of the Agreement.

Inspection and testing of materials will be performed by the City unless otherwise specified.

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material and equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the City.

Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the City formally takes over the operation thereof.

G-5.02 COSTS
All inspection and testing of materials furnished under this Contract will be performed by the City or duly authorized inspection engineers or inspection bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the contract price.

Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the City for compliance. The Contractor shall reimburse the City for the expenditures incurred in making such tests on materials and equipment which are rejected for noncompliance.

G-5.03 INSPECTIONS OF MATERIALS
The Contractor shall give notice, in writing to the Engineer, sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice the Engineer will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

G-5.04 CERTIFICATE OF MANUFACTURE
When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

G-5.05 SHOP TESTS OF OPERATING EQUIPMENT
Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the Engineer notifies the Contractor, in writing, that the results of such tests are acceptable.

Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval.

The cost of the shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

G-5.06 PRELIMINARY FIELD TESTS
As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments, and replacements required.

G-5.07 FINAL FIELD TESTS
Upon completion of the work and prior to final payment, all equipment and appliances installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment, and instruments necessary for all acceptance tests, at no additional cost to the City.

G-5.08 FAILURE OF TESTS
Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor by replacements or otherwise. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make those corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees or specified requirements, the City, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

In case the City rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If he fails to do so, the City may, after the expiration of a period of thirty calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under this Contract.

The City agrees to obtain other equipment within a reasonable time and the Contractor agrees that the City may use the equipment furnished by him without rental or other charges until the new equipment is obtained.

Materials or work in place that fails to pass acceptability tests shall be retested at the direction of the construction engineer all such retests shall be at the Contractor's expense. The rates charged shall be in accordance with the Department of Public Works current annual inspection contract which is available for inspection at the offices of the Department of Public Works.

G-5.09 FINAL INSPECTION
The procedures for final inspection shall be in accordance with the provisions of Article 4.07 of the Agreement. During such final inspections, the work shall be clean and free from water. In no case will the final estimate be prepared until the Contractor has complied with all the requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily cosntructed in accordance with the requirements of the Contract Documents.

SECTION 6

TEMPORARY STRUCTURES

G-6.01 GENERAL
All false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the work and which are not herein described or specified in detail, must be furnished, maintained and removed by the Contractor, and he shall be responsible for the safety and efficiency of such works and for any damages that may result from their failure or from their improper construction, maintenance, or operation.

G-6.02 PUBLIC ACCESS
At all points in the work where public access to any building, house, place of business, public road, or sidewalk would be obstructed by any action of the Contractor in executing the work required by this Contract, the Contractor shall provide such temporary structure, bridges or roadway as may be necessary to maintain public access at all times. At least one lane for vehicular traffic shall be maintained in streets in which the Contractor is working. Street closure permits are required from the Department of Public Works.

The Contractor shall provide suitable temporary bridges, as directed by the Engineer, at street intersections when necessary for the maintenance of vehicular and pedestrian traffic.

Prior to temporarily cutting of access to driveways and garages, the Contractor shall give twelve (12) hours notice to affected property owners. Interruptions to use of private driveways shall be kept to a minimum.

G-6.03 CONTRACTOR'S FIELD OFFICE
The Contractor shall erect, furnish and maintain a field office with a telephone at the site during the entire period of construction. He or an authorized agent shall be present at this office at all times while his work is in progress. Readily accessible copies of both the Contract Documents and the latest approved working drawings shall be kept at this field office.

G-6.04 TEMPORARY FENCE
If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the Engineer, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The Engineer shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

G-6.05 RESPONSIBILITY FOR TEMPORARY STRUCTURES
In accepting the Contract, the Contractor assumes full responsibility for the sufficiency and safety of all temporary structures or work and for any damage which may result from their failure or their improper construction, maintenance, or operation and will indemnify and save harmless the City from

all claims, suits or actions and damages or costs of every description arising by reason of failure to comply with the above provisions.

SECTION 7
TEMPORARY SERVICES

G-7.01 WATER
The Contractor shall provide the necessary water supply at his own expense. He shall, if necessary, provide and lay necessary waterlines from existing mains to the place of using, shall secure all necessary permits and pay for all taps to water mains or hydrants and for all water used at the established rates.

G-7.02 LIGHT AND POWER
The Contractor shall provide, at his own expense, temporary lighting and power facilities required for the proper prosecution and inspection of the work. If, in the opinion of the Engineer, these facilities are inadequate, the Contractor will not be permitted to proceed with any portion of the work affected thereby.

G-7.03 SANITARY REGULATIONS
The Contractor shall prohibit and prevent the committing of nuisances on the site of the work or on adjoining property and shall discharge any employee who violates this rule.

Ample washrooms and toilet facilities and a drinking water supply shall be furnished and maintained in strict conformity with the law by the Contractor for use by his employees.

G-7.04 ACCIDENT PREVENTION
Precautions shall be exercised at all times for the protection of persons and property. The safety provisions of applicable laws, building and construction codes shall be observed. The Contractor shall comply with the U. S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596), and under Section 107 of the Contract Work. Hours and Safety Standards Act (PL 91-54), except where state and local safety standards exceed the federal requirements and except where state safety standards have been approved by the Secretary of Labor in accordance with provisions of the Occupational Safety and Health Act.

G-7.05 FIRST AID
The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when men are employed on the work.

G-7.06 HEATING
The Contractor shall provide temporary heat, at his own expense, whenever required on account of work being carried on during cold weather and to prevent freezing of water pipes and other damage to the work.

SECTION 8
LINES AND GRADES

G-8.01 GENERAL
All work done under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

The Engineer will establish bench marks and base line controlling points. Reference remarks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

G-8.02 SURVEYS
The Contractor shall furnish and maintain, at his own expense, stakes and other such materials, and give such assistance, including qualified helpers, as may be required by the Engineer for setting reference marks. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof. He shall, however, be subject to the check and review of the Engineer.

The Contractor shall keep the Engineer informed a reasonable time in advance as to his need for line and grade reference marks, in order that they may be furnished and all necessary measurements made for record and payment with the minimum of inconvenience to the Engineer or of delay to the Contractor.

It is the intention not to delay the work for the establishment of reference marks but, when necessary, working operations shall be suspended for such reasonable time as the Engineer may require for this purpose.

G-8.03 SAFEGUARDING MARKS
The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

G-8.04 DATUM PLANE
All elevations indicated or specified refer to the Mean Sea Level Datum of the U.S.C. & G.S. (N.O.S.) which is 0.80 feet above the Mean Low Water Datum of the U. S. Army

Corps of Engineers.

SECTION 9
ADJACENT STRUCTURES AND LANDSCAPING

G-9.01 RESPONSIBILITY
The responsibility for removal, replacement, relocation, repair, rebuilding or protection of all public utility installations, including poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes, sewers, traffic control and fire alarm signal circuit installations and other appurtenances and facilities shall be in accordance with G-1.02 and G-1.03.

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation, and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate payment will be made therefor. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the Engineer, removal or relocation and reconstruction is necessary to avoid interference with the work, payment therefor will be made as provided for extra work in Article 7.02 of the Agreement.

G-9.02 PROTECTION OF TREES
All trees and shrubs shall be adequately protected by the Contractor with boxes or otherwise and, within the City of Tampa, in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season, and at the sole expense of the Contractor.

Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.

The City may order the Contractor, for the convenience of the City, to remove trees along the line of trench excavation. If so ordered, the City will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

G-9.03 LAWN AREAS
Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed and later replaced, or the area where sod has been removed shall be restored with new sod in the manner described in the Technical Specifications section.

G-9.04 RESTORATION OF FENCES
Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the Engineer. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or Items, or if no specific Item is provided therefor, as part of the overhead cost of the work, and no additional payment will be made therefor.

SECTION 10
PROTECTION OF WORK AND PUBLIC

G-10.01 TRAFFIC REGULATIONS
The Contractor shall arrange his work to comply with Article G-6.02. The work shall be done with the least possible inconvenience to the public and to that end the work may be confined by the Engineer to one block at a time.

G-10.02 BARRIERS AND LIGHTS
During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers, and lights, as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public. Such barriers and signs shall be constructed to State of Florida Department of Transportation standards and placed as recommended by the Traffic Division of the City's Department of Public Works.

No open fires will be permitted.

G-10.03 SMOKE PREVENTIONS
The Contractor shall use hard coal, coke, oil or gas as fuel for equipment generating steam. A strict compliance with ordinances regulating the production and emission of smoke will be required.

G-10.04 NOISE
The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all gasoline motors or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

Except in the event of an emergency, no work shall be done between the hours of 7:00 p.m. and 7:00 a.m., or on Sundays. If the proper and efficient prosecution of the work requires operations during the night, the written permission of the Engineer shall be obtained before starting such items of the work.

G-10.05 ACCESS TO PUBLIC SERVICES
Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

G-10.06 DUST PREVENTION
The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the streets sprinkled with water at all times.

G-10.07 PRIVATE PROPERTY
The Contractor shall so conduct the work that no equipment, material, or debris will be placed or allowed to fall upon private property in the vicinity of the work unless he shall have obtained the owner's written consent thereto and shall have shown this consent to the Engineer.

SECTION 11
SLEEVES AND INSERTS

G-11.01 COORDINATION
When the Contract requires the placing of conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors, and other like work in floors, roofs, or walls of buildings and structures, they shall be promptly installed in conformity with the construction program. The Contractor who erects the floors, roofs, and walls shall facilitate such work by fully cooperating with the Contractors responsible for installing such appurtenances. The Contractor responsible for installing such appurtenances shall arrange the work in strict conformity with the construction schedule and avoid interference with the work of other contractors.

G-11.02 OPENINGS TO BE PROVIDED
In the event timely delivery of sleeves and other materials cannot be made and to avoid delay, the affected Contractor may arrange to have boxes or other forms set at the locations where the appurtenances are to pass through or into the floors, roofs, walls, or other work. Upon the subsequent installation of these appurtenances, the Contractor erecting the structure shall fill around them with materials as required by the Contract. The necessary expenditures incurred for the boxing out and filling in shall be borne by the Contractor or Contractors required to furnish the sleeves and inserts. Formed openings and later installation of sleeves will not be permitted at locations subject to hydrostatic pressure.

SECTION 12
CUTTING AND PATCHING

G-12.01 GENERAL
The Contractor shall do all cutting, fitting, or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Plans and Specifications. The work must be done by competent workmen skilled in the trade required by the restoration.

SECTION 13
CLEANING

G-13.01 DURING CONSTRUCTION
During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris, and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefor develops.

G-13.02 FINAL CLEANING
At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished, and new appearing condition.

SECTION 14
MISCELLANEOUS

G-14.01 PROTECTION AGAINST SILTATION AND BANK EROSION
The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed watercourses and drainage ditches.

G-14.02 EXISTING FACILITIES
The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Work shall be scheduled to minimize bypassing during construction. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.

G-14.03 USE OF CHEMICALS
All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

* * * * * * *

SUPPLEMENTARY GENERAL PROVISIONS

1.0 GENERAL:

1.1 This Section sets forth modifications to the "General Provisions" of the Contract Documents which are referred to as Specifications, General Provisions.

1.2 Paragraph numbers and titles used herein refer to similarly numbered and titled articles in the General Provisions.

1.3 Only those paragraphs contained herein shall be assumed to be modified. Paragraphs not appearing herein shall apply as written in the General Provisions.

1.4 Any portion of the General Provisions, whether or not modified herein, may be further modified in Special Conditions and in the Instructions to Bidders of these Specifications.

1.5 Where the Supplementary General Provisions, Special Conditions and Instructions to Bidders conflict with the General Provisions, the Supplementary General Provisions, Special Conditions and the Instructions to Bidders shall take precedence.

2.0 MODIFICATIONS TO THE GENERAL PROVISIONS AS FOLLOWS:

2.1 SECTION 1 SCOPE AND INTENT

G-1.02 WORK INCLUDED

The first paragraph shall be deleted in its entirety and replaced by the following paragraph:

"The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the work. He shall obtain all required permits. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until incidental thereto. He shall repair or restore all during performance of the work."

2.2 SECTION 3 WORKING DRAWINGS

a. Change to read as follows:

SECTION 3 SHOP DRAWINGS

b. Replace the existing paragraphs in their entirety with the following paragraphs:

G-3.01 SCOPE

Shop drawings, schedules, etc., shall be submitted to the Engineer and/or Architect in quadruplet, accompanied by a letter of transmittal. Subcontractors and suppliers shall submit shop drawings and make requests for approvals through their respective prime Contractors.

The drawings shall be numbered consecutively and shall accurately and distinctly present the following:

(1) Names of equipment or materials, and the locations at which the equipment or materials are to be installed in the work.

(2) All working and erection dimensions.

(3) Arrangement and sectional views.

(4) Necessary details, including complete information for making connections between work under this contract and work under other contracts.

(5) Kinds of materials and finishes.

(6) Parts list and description thereof.

The Engineer and/or Architect may decline to consider any shop drawing that does not contain complete data on the work and full information of related matters.

Fax submittals will not be reviewed.

G-3.02 APPROVAL:

Shop drawings shall be examined by the Contractor prior to his transmitting them to the Engineer and/or Architect. Shop drawings submitted to the Engineer and/or Architect shall bear the Contractor's stamp of approval evidencing that he has examined and checked each drawing and that he has found said drawings to be in accordance with the Contract requirements. Any drawings submitted without this stamp will not be considered by the Engineer and/or Architect and will be returned to the Contractor for re- submission.

If the shop drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of submittal and the following shall be submitted:

(1) Each request shall include a complete description of the proposed substitute and the name of the material or equipment for which it is to be substituted.

(2) Furnish drawings, cut, manufacturer's printed specifications, performance and test data and any other data or information necessary for a complete evaluation of both the item specified and the proposed substitute item.

Approval of the drawings shall constitute approval of the subject matter thereof only and not of any structure, material, equipment or apparatus shown or indicated.

Approval of the drawings shall be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the quantities of materials and equipment, nor for the proper fitting and construction of the work, nor for the furnishing of materials, tools, equipment, etc., required by this contract and not indicated on the drawings.

No work called for by Shop Drawings shall be done until the said drawings have been approved by the Engineer and/or Architect.

The Contractor shall revise and resubmit the shop drawings as required by the Engineer and/or Architect until approval thereof is obtained.

The City shall retain four (4) copies of all submittals unless the Engineers and/or Architect makes a specific request for additional copies.

Items	Submittals	*Approval
All trade	Fourteen (14) Days	Fourteen (14) Days

*From date of receipt of submittal.

Delays on account of tardy or untimely submittals will not be considered as causes of extension of time of the Contract or increases to the Contract Sum.

G-3.03 JOB SITE:

One (1) copy of all approved submittals SHALL BE available at the Contractor's Office at the job site.

2.3 SECTION 4 MATERIALS AND EQUIPMENT

G-4.01 GENERAL REQUIREMENTS

In the first paragraph, second line, delete the word "specifications" and substitute the words "Contract Documents".

G4.03 REFERENCE TO STANDARDS

The following paragraph shall be added in its entirety:

"Compliance with the Standard Building Code, latest edition, and all local electrical and plumbing codes shall be required. In the event of a conflict in code requirements, the most stringent code or standard shall apply."

G-4.05 EQUIVALENT QUALITY

Add the following sentence to paragraph two: "Any professional fees associated with shop drawing review of materials or equipment submitted for approval as equivalent to that specified shall be borne by the Contractor.

2.4 SECTION 5 INSPECTION AND TESTING

G-5.06 PRELIMINARY FIELD TESTS

G-5.07 FINAL FIELD TEST

A. Add the following sentence to BOTH of the above paragraphs:

The Contractor shall provide, at NO EXTRA COST to the City, ALL labor, tools, equipment, materials, etc., for the Engineer and/or Architect to make any field test that may be required in the judgment of the Engineer and/or Architect.

2.5 SECTION 6 TEMPORARY STRUCTURES

G-6.03 CONTRACTOR'S FIELD OFFICE

a. In the last sentence of this paragraph, add the following words: "...and Shop Drawings".

G-6.03 CONTRACTOR'S FIELD OFFICE

A. Delete this paragraph G-6.03 in its entirety.

2.6 SECTION 7 TEMPORARY SERVICES

G-7.01 WATER, G-7.02 LIGHT AND POWER, AND G-7.03 SANITARY REGULATIONS

The City of Tampa shall provide, at no cost to the Contractor, water, electricity and washroom/toilet facilities for installation of this project. All water and electricity shall be applied and/or connected by the Contractor.

G-7.07 TELEPHONE

The Contractor shall furnish the Engineer with a telephone number(s) by which the Engineer may contact the site.

2.7 SECTION 14 MISCELLANEOUS

G-14.04 USE OF EXPLOSIVES:

Explosives will not be used on the work except when authorized by the Engineer and/or Architect. The use of same, if authorized, shall conform to laws or ordinances which may pertain to the use of same and the utmost care will be exercised by the Contractor so as not to endanger life or property. The Contractor will assume full responsibility in connection with use of any explosives even though authorized. Explosives will not be stored within the City limits.

G-14.05 OWNERSHIP OF MATERIALS:

The removal of any underground and surface structures as required shall be performed in a careful manner to permit salvaging of as much material, such as pipe and brick, also broken section of sidewalk, as practical for use in repair and maintenance of City-owned facilities.

Such acceptable salvaged material remains the property of the City and shall be placed in stock piles so as not to interfere with new construction work but accessible for loading and hauling by the City or by the Contractor within the free haul limit of six (6) miles. The Engineer and/or Architect shall direct the Contractor as to the location of stockpile.

The paving material, such as vitrified brick, asphalt block and other paving materials removed from the excavated areas and suitable for reuse but not reused in the work, shall also be considered the property of the City. The handling of such materials shall be as set forth elsewhere in the Specifications or Special Provisions.

G-14.06 NOTICE OR SERVICE THEREOF:

All notices, which shall include demands, instructions, requests, approvals and claims, shall be in writing.

Any notice to or demand upon the Contractor shall be sufficiently given if delivered to the office of the Contractor specified in the bid (or to such other office as the Contractor may, from time to time, designate to the City in writing), or if deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered, with charges case addressed to such office.

All notices required to be delivered to the City shall, unless otherwise specified in writing to the Contractor, be delivered to Contract Administration Department – Construction Management Division, 3808 East 26th Avenue, Tampa, Florida 33605, and any notice to or demand upon the City shall be sufficiently given if delivered to the office of the said Engineer and/or Architect, or if deposited in the United States mail in a sealed, postage- prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to said Engineer and/or Architect or to such other representative of the City or to such other address as the City may subsequently specify in writing to the Contractor or to its representative at the construction site for such purposes.

Any such notice or demand shall be deemed to have been given or made as of the time of actual delivery or (in the case of mailing) when the same should have been received in due course of post or (in the case of telegram) at the time of actual receipt, as the case may be.

G-14.07 REQUIREMENTS FOR CONTROL OF THE WORK:

Prior to the start of the work included in this contract, a Preconstruction Conference will be held by the Engineer and/or Architect to be attended by the Contractor and representatives of the various utilities and others for the purpose of establishing a schedule of operations which will coordinate the work to be done under this contract with all related work to be done by others within the limits of the project. The Contractor shall be prepared for this meeting and shall present a comprehensive construction schedule for all items of work to be accomplished by him, which will be used as the basis for the development of an overall operational schedule and a list of subcontractors to be used on this work.

All items of work on this contract shall be coordinated so that progress on each related work item will be continuous from week to week. The progress of the work will be reviewed by the Engineer and/or Architect at the end of each week, and if the progress on any item of work during that week is found to be unsatisfactory, the Contractor shall be required to adjust the rate of progress on that item or other items as directed by the Engineer and/or Architect.

The Contractor shall conduct his operations in such a manner as will result in a minimum of inconvenience to occupants of adjacent homes and business establishments and shall provide temporary access as directed or as conditions in any particular location may require.

G-14.08 WORK DIRECTIVE CHANGE:

"A Work Directive Change is a written directive to the Contractor, issued on or after the date of the execution of the Agreement, and signed by the Engineer on behalf of the City, ordering an addition, deletion or revision in the work, or responding to an emergency. A Work Directive Change will not change the contract price or the time for completion, but is evidence that the parties expect that the change directed or documented by a Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the contract price or the time for completion. "Without invalidating the Agreement, additions, deletions or revisions in the Work may, at any time or from time to time, be authorized by a Change Order or a Work Directive Change. Upon receipt of any such document, the Contractor shall promptly proceed with the work involved."

DELETE AS REQUIRED BELOW

G-14.09 RESERVED PARKING SIGNS IN PARKING METER AREAS

The Contractor shall reimburse the Department of Public Works, Parking Division, located at 107 N. Franklin Street, Tampa, Florida 33602, for any and all metered parking spaces occupied or made unusable or unavailable as a result of, or because of, construction activity by the Contractor. Private automobiles may not be parked in any reserved space, unless clearly marked as associated with the project.

In order to receive temporary or permanent reserved signs in parking areas which are required by parking meters, there shall first be paid to the Parking Revenue Fund for the elimination of each such meter a charge based on the following schedules:

1. Meter Removal: The charge for removing a meter is ten (10) times the hourly meter fee, with a minimum charge of $12.50. Such charge will be assessed for each day a meter is removed, excluding Saturdays, Sundays, and City holidays.

2. Reservation of Parking Metered Spaces During Hours of City Parking Division Operation: The charge for reservation of a metered space is ten (10) times the hourly meter fee. Such charge will be assessed for each day a meter is reserved. The minimum total charge per rental agreement is $12.50.

3. Reservation of Parking Metered Spaces During Hours of City Parking Division Non- Operation: The charge for reservation of a metered space during hours of non-operation shall be $2.00. Such charge will be assessed for each day a meter is reserved. The minimum charge per rental agreement is $12.50.

4. Reservation of Parking Metered Spaces During Hours of City of Tampa Parking Division Operation and Non-Operation: Meter reservation periods, which include both operation and non-operational hours, shall be charged the operational rate.

In the event that an entire block or area of parking meters are reserved for a period of 90 days or longer, the Contractor may arrange a payment schedule with the Department of Logistics and Asset Management, Parking Division. Said payment schedule will be paid on a monthly basis after a deposit equivalent to the first and last month rental charges has been received by the Parking Division prior to commencement of construction.

Any meter or meters which may sustain damage due to construction activities in the immediate area must be removed. The meter removal/installation charge is $7.50 per meter. Failure to have a meter(s) removed will result in the Contractor being held liable for damage occurring to said meter(s) and further, the Contractor will be required to reimburse the Department of Logistics and Asset Management for meter(s) repaired or replaced.

G-14.10 EROSION AND SEDIMENT CONTROL:

During construction, the Contractor shall provide adequate erosion and sediment controls to prevent adverse effects to the environment and public and private property. He shall construct and maintain control structures necessary to prevent erosion and sediment. He shall conduct and schedule construction operations to avoid, prevent, and minimize erosion and sediment. He shall comply with City, County, State, and Federal codes, laws, and regulations and the plans and specifications for this project pertaining to erosion and sediment prevention and control.

At the Preconstruction Conference, the Contractor shall present a plan for erosion and sediment prevention and control. This plan shall include the operations methods, also temporary and permanent control measures and structures to be used on this project.

G-14.11 ENGINEER'S FIELD OFFICE:

The Contractor shall provide and maintain an adequate field office, which shall be a structure completely separated from the Contractor's field office, for the exclusive use of the Construction Engineer and/or Architect and engineering technicians within the project limits. No additional payment shall be made for this item. Location of said field office shall be as directed by the Engineer and/or Architect.

Contractor shall provide one (1) desk with chair, one (1) four-drawer metal file cabinet with lock, plan rack to hold a minimum of eight (8) separate sets of plans and one (1) plan table, top shall be minimum of 3'-0" wide x 6'-8" long; also adequate heating, air conditioning, lighting and one (1) window, 36"x36" minimum size, in each of four (4) walls.

G-14.12 PROJECT SIGNS:

The Contractor shall furnish and install, as directed by the Engineer and/or Architect, a project sign of design, size, color, etc., as per drawing page SIGN-1.

G-15.0 NOTIFICATION TO CONTRACTORS:

All Contractors working in City of Tampa buildings and facilities that contain ACM will be provided with a written notice, including contract custodial firms. The notice when applicable will advise Contractors about the possibility of encountering ACM while working for the City and will require Contractors to become familiar with locations of ACM within their work areas. The Contractor Notice shall include the name and phone number of the designated Building Asbestos Contact Person assigned to that building/facility. This notice is provided in Appendix C.

Appendix C

Contractor Notification Requirements

Asbestos-Containing Material (ACM) may be present in the facility. The presence of ACM does not necessarily mean that a hazard exists; however, a hazard may be created when ACM is disturbed and asbestos fibers become airborne. The best way to maintain a safe environment is to avoid the disturbance of ACM.

It is possible that you may encounter ACM while working in the facility. On the bulletin board, there is a summary of known locations of ACM in that building. The summary may or may not be all inclusive. Therefore, workers must exercise caution and be watchful for materials that might contain asbestos. Avoid disturbing ACM or suspected ACM as you carry out your work.

If your work necessitates the disturbance of ACM you shall take whatever precautions that are necessary to protect human health and the environment from asbestos fibers. At minimum, you will comply with all Federal, Sate, and Local responsible for assuring that you are medically certified, trained, and equipped with the proper personal protective devices for safe handling of ACM. You must notify the designated Building Asbestos Contact Person before disturbing any asbestos-containing materials in City-Owned buildings. The designated Building Asbestos Contract Person is listed on the bulletin board with the asbestos location summary.

If you need additional information regarding ACM in a particular building or would like to see a copy of the Operations and Maintenance Plan, contact the Building Asbestos Contact Person responsible for the building for which you will be working.

Comply with all regulatory requirements for removal and disposal.

SPECIAL CONDITIONS

1.0 PRECONSTRUCTION BRIEFING:

The Contractor, upon receiving notice that he has been awarded the contract for the construction of the project, shall make an appointment with the Engineer and/or Architect for said briefing. The Contractor shall bring to this meeting the following:

1. Contract Documents not yet submitted.
2. A detailed Job Progress Schedule.
3. Samples, questions, etc., he feels necessary.
4. List of subcontractors.

Failure to bring the above items to the meeting will result in cancellation of meeting. Once items have been submitted, meeting will be rescheduled by the City. Site access and commencement of work will not be allowed during period between meetings.

Contractor shall have representatives present at meeting that are familiar with, and conversant on, the scope of the work and Contract Document requirements. Failure to have such persons present will also result in cancellation and rescheduling of meeting until such a time when condition is corrected.

Elapsed time as a result of the Contractor's failure to comply with above will not result in an extension of contract time.

2.0 SITE REVIEW:

Before submitting Proposals, Bidders shall carefully examine the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and make all necessary investigations to inform themselves thoroughly as to the facilities for delivering, placing and operating the necessary construction equipment, and for delivering and handling materials at the site, and inform themselves thoroughly as to all difficulties involved in the completion of all the work in accordance with the Contract Documents.

The Contractor shall immediately, upon entering project site for the purpose of beginning work, review project site with the Engineer and/or Architect for the purpose of selecting area(s) to place materials for storage.

The Contractor must exercise proper precaution to verify all figures shown or indicated on the drawings, all existing trees, paved areas; utilities, etc., shall be located before beginning any work, and he shall be held responsible for any error resulting from his failure to exercise such precaution.

2.1 LAYING OUT WORK:

The Contractor shall locate all general reference points and take necessary action to prevent their destruction; lay out his own work and be responsible for all lines, elevations, measurements, grading, trenching, backfilling, utilities and other work to be executed by him for a complete project under this contract.

The Contractor shall lay out all work and have final approval by the Engineer and/or Architect before installation begins. Contractor shall be held responsible for any error resulting from his failure to exercise such approval. Said errors shall be corrected by the Contractor at NO EXTRA COST to the City.

The Contractor shall coordinate with the Parks Department and shall identify each and every tree to remain prior to the start of work. The specific trees to remain shall be approved by the Parks Department.

The final location of all work to be performed shall be made jointly by the Engineer and/or Architect and the Contractor at the project site.

3.0 SAFETY AND HEALTH STANDARDS:

The performance of all construction under this contract shall conform to ALL Local, State, Federal Occupation Safety and Health Act Standards.

At the end of each work day, all work areas shall be left in a safe condition. Barricades and/or warning devices shall be provided for at any open excavations or barriers on the project site.

The Contractor's attention is directed to paragraphs Article 3.07 and Article 12.03 of the Agreement, and paragraph G-7.04 of the General Provisions.

4.0 INFORMATION FOR COLOR SCHEDULES:

Not later than thirty (30) calendar days after authorization to proceed with contract work, the Contractor shall submit to the Engineer and/or Architect the names of all manufacturers and trade names for all materials involving selection based upon color or texture or other design appearance features which are to be used in this project. Where samples are necessary for such selection, furnish same.

If such information is not furnished by Contractor within thirty (30) day period, the Engineer and/or Architect will select colors and textures from products named in the Contract Documents.

5.0 RESPONSIBILITY OF CONTRACTOR:

The Contractor shall take all necessary precautions to protect all project surfaces and adjoining areas from mechanical damage from tools, equipment, materials, supports, etc., and shall provide adequate protection from leaking lubricants or fluids from his equipment.

Damage to said project surfaces and adjoining areas caused by a lack of protection or negligence by the Contractor shall be repaired and/or replaced at NO EXTRA COST to the City and to the full satisfaction of the Engineer and/or Architect.

The Contractor and all subcontractors are charged with the protection of the work and property, but the final responsibility for these provisions rests with the Contractor who shall take complete charge of the project site from start to finish of work.

The Contractor shall take particular precautions to protect existing trees and plant material. All trees and other plant material to remain shall be marked by the City prior to start of work.

Excavation, earthwork or sitework within the drip line of existing trees shall be done either manually or by methods approved by the City of Tampa Parks Department.

If the Contractor damages any tree or plant material in any way he shall be required to replace the damaged tree or plant material as follows:

1. Trees

   a. Replace a 6" caliper or less with a 6" caliper of the same species.

   b. Replace a 7"-10" caliper with two (2) 6" caliper of the same species.

   c. Replace a 10"-15" caliper with three 6" caliper of the same species.

   d. Replace a 16"-20" caliper with five (5) 6" caliper of the same species.

e. Replace a 21"-36" caliper with ten (10) 6" caliper of the same species.

2. Plant Material

Replace any damaged plant material with an equal size and quantity of the same material.

The replaced trees and plant material shall be guaranteed by the Contractor for a period of six (6) months.

6.0 COORDINATION WITH N.I.C. ITEMS:

The Contractor shall give to the Engineer and/or Architect, in writing, a time schedule for the installation or removal of all N.I.C. items at the beginning of the project. Failure of the Contractor to supply the Engineer and/or Architect with said schedule shall not be used for reason of time extension by the Contractor.

7.0 ELECTRICAL SERVICE LOCATION:

The Contractor shall verify and coordinate the service location with the local power company and the Engineer and/or Architect.

The Contractor shall coordinate with the local power company and shall include in his bid all costs for electrical service to work area(s) under this Contract, including but not limited to new service, connections from existing and/or new service and all required labor, equipment, materials etc. and all other associated electrical work.

8.0 SCHEDULING:

The Contractor shall provide the City with a detailed schedule prior to start of work.

The schedule shall be a fully developed, horizontal bar-chart type Contractor's construction schedule. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".

Unless otherwise directed or approved, prepare schedule on a single 8-1/2" X 14" sheet of plain bond white paper.

Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.

Contractor shall also prepare schedule in accordance with applicable portions of Section 4.02 of the Agreement.

9.0 ASSIGNMENT OF CONTRACT: Not applicable.

10.0 WORKMANSHIP AND MATERIALS:

Workmanship and materials shall be installed in accordance with accepted standards of the specific trade, as defined by the applicable recognized trade association(s). In the event of a conflict between these trade standards and the Contract Documents, the conflict shall be brought to the Engineer's and/or Architect's attention writing and the final decision shall be made by the Engineer and/or Architect.

11.0 RECORD DRAWINGS:

During the course of the work, Contractor shall maintain, at the site, a clean undamaged set of the Contract Documents. Contractor shall mark set, on a daily basis, with location and progress of all contract work, including but not limited to:

1. Sewer, water, stormwater and irrigation fabrication drawings showing to scale all manholes, all distances and angles between manholes, line dimension, grid co-ordinates, trunk lines, inverts and cleanouts,

2. Fencing, roadway, parking and sleeving,

3. Electrical service, and

4. General building location, and/or foundations, structures, etc.

Drawings shall be on site at all times and available for review by the City. Failure of Contractor to have drawings on site and/or up to date may result in suspension of work until situation is corrected. Extension of contract will not be granted for such condition.

At conclusion of work, the Contractor shall provide the City with one complete set of Electronic Record Drawings incorporating changes described above, and four marked hard copy sets of as-built record drawings clean and damaged free shall also be submitted to the City at the same time. Electronic files will be issued to the Contractor by the City of Tampa. These files will be AutoCAD DWG, AutoCAD DWF or Adobe PDF latest versions.

A Work Directive Change is a written directive to the Contractor, issued on or after the date of the execution of the Agreement, and signed by the Engineer on behalf of the City, ordering an addition, deletion or revision in the work, or responding to an emergency. A Work Directive Change will not change the contract price or the time for completion, but is evidence that the parties expect that the change directed or documented by an Authorization to Proceed with Extra Work letter will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the contract price or the time for completion.

12.0 ON SITE RECYCLABLE CRITERIA:

Contractor shall make reasonable attempts to recycle and/or salvage at least 50% of non-hazardous construction and demolition debris. Contractor shall develop and implement a Construction Waste Management Plan that identifies the materials that are to be diverted from disposal by weight or volume and be directed to a recycling facility. Specific area(s) on the construction site shall be designated for collection and tracking of the designated materials as needed. Location of the recycling area on site shall be coordinated with the project owner's representative on site prior to construction start. The intent of this section is to encourage recycling where practical in the context of the scope of work.

Contractor shall submit the following but not limited to items related to this section:

1. Provide a submittal of the contractor's plan of action to recycle

2. Contractor is required to document all activities with above requirements and provide to the city upon request items that are recyclable, documentation of the quantity of material disposed at a recycling facility.

City of Tampa – DMI Sub-(Contractors/Consultants/Suppliers) Payments

(FORM MBD-30)

[ ] Partial [ ] Final

Contract No.: _____ WO#,(if any):_____ Contract Name:_____

Contractor Name:_____ Address:_____

Federal ID:_____ Phone:_____ Fax:_____ Email:_____

GC Pay Period:_____ Payment Request/Invoice Number:_____ City Department:_____

Total Amount Requested for pay period: $_____ Total Contract Amount(including change orders):$_____

-Type of Ownership - (F=Female M=Male), BF BM = African Am., HF HM = Hispanic Am., AF AM = Asian Am., NF NM = Native Am., CF CM = Caucasian S = SLBE

Type Trade/Work Activity []Sub []Supplier Federal ID	Company Name Address Phone & Fax	Total Sub Contract Or PO Amount	Amount Paid To Date Amount Pending Previously Reported	Amount To Be Paid For This Period Sub Pay Period Ending Date
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$

(Modifying This Form or Failure to Complete and Sign May Result in Non-Compliance)

Certification: I hereby certify that the above information is a true and accurate account of payments to sub – contractors/consultants on this contract.

Signed:_____ Name/Title:_____ Date:_____

Note: Detailed Instructions for completing this form are on the next page

Page 2 of 2 – DMI Payment

Instructions for completing The DMI Sub-(Contractors/Consultants/ Suppliers) Payment Form (Form MBD-30)

This form must be submitted with all invoicing or payment requests where there has been subcontracting rendered for the pay period. If applicable, after payment has been made to the subcontractor, "Waiver and Release of Lien upon Progress Payment", "Affidavit of Contractor in Connection with Final Payment", or an affidavit of payment must be submitted with the amount paid for the pay period. The following will detail what data is required for this form. The instructions that follow correspond to the headings on the form required to be completed. **(Modifying or omitted information from this form my result in non-compliance).**

- **Contract No.** This is the number assigned by the City of Tampa for the bid or proposal.
- **W.O.#** If the report covers a work order number (W.O.#) for the contract, please indicate it in that space.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business.
- **Address.** The physical address of your business.
- **Federal ID.** A number assigned to a business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **Pay Period.** Provide start and finish dates for pay period. (e.g. 05/01/13 – 05/31/13)
- **Payment Request/Invoice Number.** Provide sequence number for payment requests. (ex. Payment one, write 1 in space, payment three, write 3 in space provided.)
- **City Department**. The City of Tampa department to which the contract pertains.
- **Total Amount Requested for pay period.** Provide all dollars you are expecting to receive for the pay period.
- **Total Contract Amount (including change orders).** Provide expected total contract amount. This includes any change orders that may increase or decrease the original contract amount.
- **Signed/Name/Title/Date**. This is your certification that the information provided on the form is accurate.
- **See attached documents.** Check if you have provided any additional documentation relating to the payment data. Located at the bottom middle of the form.
- **Partial Payment.** Check if the payment period is a partial payment, not a final payment. Located at the top right of the form.
- **Final Payment.** Check of this period is the final payment period. Located at the top right of the form.

The following instructions are for information of any and all subcontractors used for the pay period.

- **(Type) of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business or SLBE.
- **Trade/Work Activity.** Indicate the trade, service, or material provided by the subcontractor.
- **SubContractor/SubConsultant/Supplier.** Please indicate status of firm on this contract.
- **Federal ID.** A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **Company Name, Address, Phone & Fax**. Provide company information for verification of payments.
- **Total Subcontract Amount.** Provide total amount of subcontract for subcontractor including change orders.
- **Amount Paid To Date.** Indicate all dollars paid to date for the subcontractor.
- **Amount Pending, Previously Reported.** Indicate any amount previously reported that payments are pending.
- **Amount To Be Paid for this Period.** Provide dollar amount of dollars requested for the pay period.
- **Sub Pay Period Ending Date.** Provide date for which subcontractor invoiced performed work.

Forms must be signed and dated or will be considered incomplete. The company authorized representative must sign and certify the information is true and accurate. Failure to sign this document or return the document unsigned can be cause for determining a company is in non-compliance of Ordinance 2008-89.

If any additional information is required or you have any questions, you may call the Minority Business Development Office at (813) 274-5522.

SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR

scale: 3" 3"

Sign Information

Building a Better Tampa

David L. Tippin Water Treatment Facility
Caustic Soda Piping Improvements

Project provides for improvements at the David L. Tippin Water Treatment Facility to improve the reliability and safety of the Sodium Hydroxide System of the water distribution system within the facility.

$TBD investment
Scheduled for completion in TBD 2014

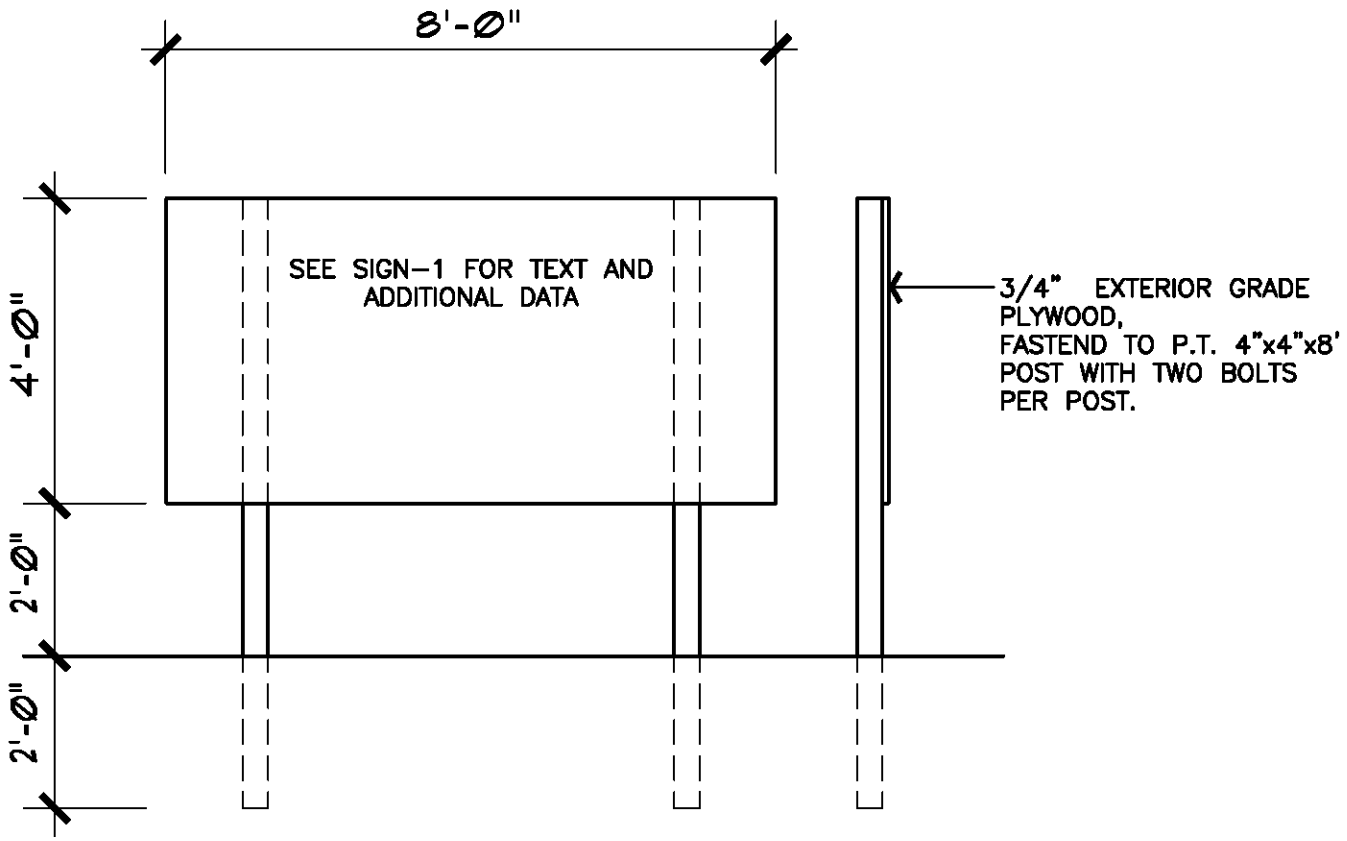
TBD

Colors

Blue: Sherwin Williams Naval SW6244
Green: Sherwin Williams Center Stage SW6920
White: Sherwin Williams Pure White SW7005

Font

Franklin Gothic



CITY OF TAMPA–PROJECT SIGN
REVISED 4/28/04

SECTION 01010 - SUMMARY OF WORK

1.0 GENERAL:

The work shall consist of furnishing all materials, labor, equipment, tools, and all items and services required for the complete construction in conformity with Contract Documents of:

Fire Station 23 Improvements
at
20770 Trout Creek Drive, Tampa, FL 33647
for the
City of Tampa

All construction work and materials, in addition to complying with requirements of Contract Documents, shall fully comply with all requirements of local building codes, all ordinances, and regulations of other Federal, State and public authorities having jurisdiction over this type of work in the given area.

2.0 SCOPE:

The work shall include but not be limited to, construction of a new 10,011 sf facility which includes site work with parking lot apron, landscaping and irrigation utilizing Florida friendly materials, masonry exterior walls, pre-fabricated trusses, metal roofing, cement plaster and thin stone finishes, HVAC including chiller with vav system, plumbing, electrical which includes minor photovoltaics, interior finishes, with all associated work required for a complete project, as shown and indicated on the Drawings and in the Specifications.

3.0 LEGAL DESCRIPTION OF PROJECT SITE:

Legal description as shown on the drawings, Sheet C-1.

4.0 VERIFICATION OF OWNER'S SURVEY DATA:

Prior to commencing any work, the Contractor shall satisfy himself as to accuracy of all survey data which shall affect his work as indicated in these plans and specifications and/or provided by the City.

Should the Contractor discover any inaccuracies or errors which will affect his work, he shall notify the Engineer and/or Architect in order that proper adjustments can be ordered.

The exact location of the building and related items shall be determined on site jointly by the Contractor and the Engineer and/or Architect. NO work shall commence until said final approval of the locations is made by the Engineer and/or Architect.

5.0 CONTRACT DOCUMENTS:

a. BIDDING REQUIREMENTS

b. GENERAL PROVISIONS, SUPPLEMENTARY GENERAL PROVISIONS, AND SPECIAL, CONDITIONS

6.0 SPECIFICATIONS: (DATED: July, 2017)

Divisions: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 16

7.0 DRAWINGS: (DATED: June 30, 2017)

Sheets: See Plan Set

8.0 ADDENDA AND LETTERS OF CLARIFICATION:

All addenda and letters of clarification issued prior to bid opening time date.

SECTION 01020 - ALLOWANCES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes administrative and procedural requirements governing allowances.

Types of allowances include the following:

Contingency allowances.

SELECTION AND PURCHASE

SUBMITTALS

Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.

CONTINGENCY ALLOWANCES

Use the contingency allowance only as directed by the Owner.

The Contractor's related costs for services, products and equipment ordered by the Owner under the contingency allowance are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

Work Directive Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

At Project closeout, credit unused amounts remaining in the contingency allowance to the Owner by Change Order.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

EXAMINATION

Examine products covered by an allowance promptly upon delivery for damage or defects.

PREPARATION

Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

SCHEDULE OF ALLOWANCES

Allowance No. 1: Include a contingency allowance of $70,000.00, which shall be included in the Base Bid price use according to the Owner's instructions. The allowance shall be included in the Base Bid.

END OF SECTION 01020

SECTION 02010 SUBSURFACE SOIL INVESTIGATION

PART 1 - GENERAL

RELATED DOCUMENTS:

The Bidding Requirements, Contractual Conditions, and General Requirements of Division One shall apply to all work hereunder.

WORK INCLUDED:

Subsurface soil investigation provided by an independent testing laboratory is included herein.

This Section, including evaluations, recommendations, and design for excavation, de-watering, foundation and pavements is included for informational purposes only. The Architect makes no claim as to the accuracy of such information.

CONTRACTOR RESPONSIBILITIES:

Verification: Prior to commencing any excavation, grading or construction, the Contractor shall satisfy himself as to the accuracy of all survey data as indicated in these Drawings and Specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors or omissions in the survey data, he shall immediately notify the Project Architect in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor, or of any excavation, grading or construction, shall be held as an acceptance of the survey data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said survey data.

END OF SECTION 02010

SECTION 02200 - EARTHWORK

1.0 GENERAL

1.1 RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Provisions, Special Conditions and Section-1 Specification sections, apply to work of this section.

Furnish all labor, materials, tools, equipment, etc., and services necessary and incidental to the complete fabrication, furnishing and erection of this section as shown, noted, detailed and reasonably implied on the drawings and in the specifications.

1.2 DESCRIPTION OF WORK:

The extent of earthwork is shown on drawings.

Preparation of subgrade for building slabs, walks, courts, and pavements is included as part of this work.

Backfilling of trenches within building lines is included as part of this work.

1.3 QUALITY ASSURANCE:

Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

Testing and Inspection Service:

An independent Testing Laboratory, paid for by the City of Tampa, shall be retained to make tests for compaction.

The results of such tests shall be immediately reported to the Engineer and/or Architect. Should any of the densities fail to meet the design criteria, the area shall be recompacted and retested at the expense of the Contractor.

Field density tests shall be taken throughout the site preparation and fill operation to insure that adequate compaction has been achieved.

1.4 JOB CONDITIONS:

Prior to commencement of work, the Contractor shall identify, by field verification, sufficient existing grade elevations for the project site. The Contractor shall verify and use existing grade elevations shown on drawings. The Contractor shall slope sidewalks and grades sufficiently to tie into the finish floor elevation. Sidewalks shall be maintained at a 1:20 slope. Prior to installation of work, the Contractor shall coordinate with the City Architect, all proposed grades and sidewalk slopes.

Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult City immediately for directions. The Contractor shall cooperate with City and utility companies in keeping respective services and facilities in operation. Repair utilities damaged as a result of the work to satisfaction of the Engineer and/or Architect and utility owner.

All existing utilities encountered in the construction of the project shall be relocated, removed or capped as required by the Engineer and/or Architect.

Do not interrupt existing utilities serving facilities occupied and used by the City or others, except when permitted in writing by Engineer and/or Architect and then only after acceptable temporary utility services have been provided.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are inactive.

Use of Explosives:

The use of explosives is not permitted.

Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

Operate warning lights as recommended by authorities having jurisdiction.

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

2.0 PRODUCTS

2.1 SOIL MATERIALS:

Definitions:

Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M145, soil classification Groups A-1, A-2-4, A-2-5, and A-3.

Unsatisfactory soil materials are those defined in AASHTO M145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7; also peat and other highly organic soils.

Base Material: Naturally or artificially graded mixture of natural, or crushed gravel, crushed stone, crushed slag, natural, or crushed sand.

Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1 1/2" sieve and not more than 5% passing a No. 4 sieve.

Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable, and other deleterious matter.

3.0 EXECUTION

3.1 EXCAVATION:

Excavation consists of removal and disposal of material encountered when establishing required finish grade elevations.

Earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer and/or Architect. Unauthorized excavation, as well as remedial work directed by Engineer and/or Architect, shall be at Contractor's expense.

Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Engineer and/or Architect.

Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer and/or Architect.

Additional Excavation: When excavation has reached required subgrade elevations, notify Engineer and/or Architect who will make an inspection of conditions.

If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Engineer and/or Architect.

Removable of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water from the excavations.

Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

Locate and retain soil materials away from edge of excavations.

Dispose of excess soil material and waste materials as herein specified.

Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

In excavating for footings and foundation, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room.

Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.

Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

Do not backfill trenches until tests and inspections have been made and backfilling authorized by Engineer and/or Architect. Use care in backfilling to avoid damage or displacement of pipe systems.

Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1 degree C).

3.2 COMPACTION:

General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.
An independent testing laboratory, paid for by the City of Tampa, shall be retained to make tests for compaction.

Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density for soils which exhibit a well-defined moisture density
relationship determined in accordance with ASTM D 1557; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship.

Structures: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum dry density or 90% relative dry density.

Building Slabs and Steps: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum dry density or 90% relatively dry density.

Lawn or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum dry density.

Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 95% maximum dry density.

Pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 95% maximum dry density.

Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.3 BACKFILL AND FILL:

General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

In excavations, use satisfactory excavated or borrow material.

Under grassed areas, use satisfactory excavated or borrow material.

Under walks and pavements, use base material or satisfactory excavated or borrow material, or combination of both.

Under building slabs, use drainage fill materials.

Backfill excavations as promptly as work permits, but not until completion of the following:

Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

Inspection, testing, approval, and recording locations of underground utilities.

Removal of concrete formwork.

Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

Removal of trash and debris.

Permanent or temporary horizontal bracing is in place on horizontally supported walls.
Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical 4 horizontal so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.

3.4 GRADING:

General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

Finish surfaces free from irregular surface changes, and as follows:

Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevations.

Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.

Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.

Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.5 PAVEMENT BASE COURSE:

Not Applicable.

3.6 BUILDING SLAB DRAINAGE COURSE:

Not Applicable.

3.7 FIELD QUALITY CONTROL:

Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

Perform field density tests in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTMD -2972-71 (nuclear method) as applicable.

Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Engineer and/or Architect.

Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests.

Foundation Wall Backfill: Take at least 2 field density tests, at locations and elevations as directed.

If in opinion of the Engineer and/or Architect, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide

3.8 MAINTENANCE:

Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.9 DISPOSAL OF EXCESS AND WATER MATERIALS:

Removal to Designated Areas on City's Property:

Transport acceptable excess excavated material to designated soil storage areas on City's property. Stockpile soil or spread as directed by the Engineer and/or Architect.

Removal from City's Property:

Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off City's property.

END OF SECTION 02200.

SECTION 02282 - TERMITE CONTROL

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Provide soil treatment for termite control, as herein specified.

SUBMITTALS

Product Data: Submit manufacturer's technical data and application instructions.

QUALITY ASSURANCE

In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work, including preparation of substrate and application.

Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.

Use only termiticides which bear a Federal registration number of the U.S. Environmental Protection Agency.

JOB CONDITIONS

Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

To insure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil toxicant manufacturer.

SPECIFIC PRODUCT WARRANTY

Furnish written warranty certifying that applied soil termiticide treatment will prevent infestation of subterranean termites and, that if subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.

Provide warranty for a period of 5 years from date of treatment, signed by Applicator and Contractor.

PART 2 - PRODUCTS

SOIL TREATMENT SOLUTION

Use an emulsible concentrate termiticide for dilution with water, specially formulated to prevent infestation by termites. Fuel oil will not be permitted as a diluent. Provide a solution consisting of one of following chemical elements and concentrations:

Chloropyrifos ("Dursban TC"); 1.0 percent in water emulsion.

Permathrin ("Dragnet", "Torpedo"); 0.5 percent in water emulsion.

Other solutions may be used as recommended by Applicator if also acceptable to Architect and approved for intended application by jurisdictional authorities. Use only soil treatment solutions which are not injurious to planting.

PART 3 - EXECUTION

APPLICATION

Surface Preparation: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.

Application Rates: Apply soil treatment solution as follows:

Under slab-on-grade structures, treat soil before concrete slabs are placed, using the following rates of application:

Apply 4 gallons of chemical solution per 10 lin. ft. to soil in critical areas under slab, including entire inside perimeter inside of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.

Apply one gallon of chemical solution per 10 sq. ft. as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.

Apply 4 gallons of chemical solution per 10 lin. ft. of trench, for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6" to 8" wide along outside of foundation to a depth of not less than 12". Punch holes to top of footing at not more than 12" o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench.

At expansion joints, control joints, and areas where slabs will be penetrated, apply at rate of 4 gals. per 10 lin. ft. of penetration.

Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.

Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

END OF SECTION 02282

SECTION 03300 CONCRETE WORK

1.0 GENERAL

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work specified in this section.

1.2 DESCRIPTION OF WORK:

The extent of concrete work shown on drawings.

1.3 QUALITY ASSURANCE:

Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

ACI 301 "Specifications for Structural Concrete for Buildings".

ACI 318 "Building Code Requirements for Reinforced Concrete".

Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

Concrete Testing Service: The City shall employ an independent testing laboratory to perform material evaluation tests.

Materials and installed work may require testing and retesting, as directed by Engineer and/or Architect, at anytime during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at City's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

Pre-Pour Conference:

Prior to placement of any concrete at the site, a pre-pour conference shall be held on-site. Conference shall take place a minimum of 24 hours before concrete placement and shall be attended by the City Architect's representative, the Contractor's site superintendent and the individual(s) performing concrete finishing. A minimum notice of 6 hours shall be given to the City Architect's office for the pre- pour conference.

At the time of the pre-pour conference, all forms and reinforcing shall be in place. Contractor shall have a dumpy level available for use.

If, in the opinion of the City Architect's representative, corrections and adjustments to the forms and reinforcing are substantial, a subsequent pre-pour conference, conforming to the above requirements shall be held.

It is the Contractor's responsibility to schedule and notify participants of pre-pour conference. Nothing in the above shall relieve the Contractor of obtaining HDC Inspectional Services inspections and approvals. Obtaining HDC approvals do not relieve the Contractor of the responsibility of the pre-pour conference.

Concrete placed without pre-pour conference will be rejected and shall be removed from site promptly by the Contractor. Elapsed time as a result of Contractor's failure to properly notify and coordinate pre-pour conference shall not be cause for extension of contract time.

1.4 SUBMITTALS:

Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Engineer and/or Architect.

Shop Drawings: Contractor shall submit 5 copies of shop drawings for all reinforcing steel. Drawing shall show bending diagrams, assembly diagrams, splicing and laps of rods, shapes, dimensions and details of bar reinforcing and accessories.

Design Mix: Submit design mix to Engineer and/or Architect for approval prior to placing concrete.

2.0 PRODUCTS

2.1 FORM MATERIALS:

Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surface with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly- placed concrete without bow or deflection.

Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge- sealed, with each piece bearing legible inspection trademark.

Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.2 REINFORCING MATERIALS:

Reinforcing Bars: ASTM A 615, Grade 60, deformed.

Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS:

Portland Cement: ANSI/ASTM C 150, Type I, unless otherwise acceptable to Engineer and/or Architect.

Use one brand of cement throughout project, unless otherwise acceptable to Engineer and/or Architect.

Fly Ash shall not be permitted.

Normal Weight Aggregates: ANSI/ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

Local aggregates not complying with ANSI/ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Engineer and/or Architect.

Water: Potable.

Air-Entraining Admixture: ANSI/ASTM C 260.

Calcium chloride not permitted.

2.4 RELATED MATERIALS:

Non-Shrink Grout: CRD-C 588, factory pre-mixed grout.

Products: Subject to compliance with requirements, provide one of the following:

Type D. Non-metallic

"Masterflor 713"; Master Builders.
"Sonogrout"; Sonneborn-Contech.
"Euco-NS"; Euclid Chemical Co.
"Five Star Grout"; U. S. Grout Co.
"Duragrout"; L & M Const. Chemical Co.

Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ANSI/ASTM C 309, Type I, Class A unless other type acceptable to Engineer and/or Architect.

Products: Subject to compliance with requirements, provide one of the following:

"Masterseal"; Master Builders.
"A-H 3 Way" Sealer; Anti-Hydro Waterproofing Co.
"Ecocure"; Euclid Chemical Co.
"Clear Seal"; W. R. Grace
"Sealkure"; Toch Div.-Carboline.
"Kure-N-Seal"; Sonneborn-Contech.
"Polyclear"; Upco Chemcial/USM Corp.
"L&M Cure"; L & M Construction Chemicals.
"Klearseal"; Setcon Industries.
"LR-151"; Protex Industries.
"Hardtop"; Gifford-Hill.

2.5 PROPORTIONING AND DESIGN OF MIXES:

Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to Engineer and/or

Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Engineer and/or Architect.

Submit written reports to Engineer and/or Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Engineer and/or Architect.

Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules.

3000 psi 28-day compressive strength; 480 lbs. cement per cu. yd. minimum; W/C ratio, 0.58 maximum.

Admixtures:

Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content within following limits:

Concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:

3% to 5% for maximum 2" aggregate.
3% to 7% for maximum 3/4" aggregate.
6% to 8% for maximum 1/2" aggregate.

Other Concrete: 2% to 4% air.

Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

Concrete: Not less than 2" and not more than 5".

2.6 CONCRETE MIXING:

Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94, and as herein specified.

Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.

Concrete at the job site shall be removed when: 1.) The period of time beginning with the introduction of water into the batch exceeds 1 1/2 hours; and/or 2.) The temperature of the concrete exceeds 91 degrees. Engineer shall have final say as to when concrete shall be removed from job site.

3.0 EXECUTION

3.1 FORMS:

Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. correct size, shape, alignment, elevation and position.

Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms complying with ACI 347, to sizes shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages,

keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wook inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement if required to eliminate mortar leaks and maintain proper alignment.

3.2 PLACING REINFORCEMENT:

Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.3 JOINTS:

Isolate Joints in Slabs-on-Ground: Construct isolation joints in slabs on ground at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.

Contraction (Control) Joints in Slabs-on-Ground: Place construction control joints in slabs-on-ground to form panels of patterns as shown. Saw cut joints as soon as possible after slab finishing without dislodging aggregate.

3.4 INSTALLATION OF EMBEDDED ITEMS:

General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instruction and directions provided by suppliers of items to be attached thereto.

Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.5 PREPARATION OF FORM SURFACES:

Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.6 CONCRETE PLACEMENT:

Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

General: Comply with ACI 304, and as herein specified.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of constructional joints, until the placing of a panel or section is completed.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

Maintain reinforcing in proper position during concrete placement operations.

Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F (27 degrees C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F (32 degrees C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

Wet forms thoroughly before placing concrete.

Use water-reducing retarding admixtures (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.7 FINISH OF FORMED SURFACES:

Rough Form Finish: For formed concrete surfaces not exposed- to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projects exceeding 1/4" in height rubbed down or chipped off.

Related Unformed Surfaces: At tops of walls, horizontal offsets surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 MONOLITHIC SLAB FINISHES:

Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom. Prior to brooming, verify direction with Architect. Coordinate required final finish with Engineer and/or Architect.

3.9 CONCRETE CURING AND PROTECTION:

General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by membrane curing, and by combinations thereof, as herein specified.

Provide moisture curing by following methods:

Keep concrete surface continuously wet by covering with water.

Continuous water-fog spray.

Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

Provide moisture-cover curing as follows:

Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

Provide curing compound to slab as follows:

Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials, unless otherwise acceptable to Engineer and/or Architect.

Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are

removed, continue curing by methods specified above, as applicable.
Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing compound.

Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.10 SHORES AND SUPPORTS:

Not Applicable.

3.11 REMOVAL OF FORMS:

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F. for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28-days. Determine potential compressive strength of inplace concrete by testing field-cured specimens representative of concrete location or members.

Form facing material may be removed 4 days after placement, only if shores and other vertical support have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.12 RE-USE OF FORMS:

Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Engineer and/or Architect.

3.13 MISCELLANEOUS CONCRETE ITEMS:

Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work or other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel- troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

3.14 CONCRETE SURFACE REPAIRS:

Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer and/or Architect.

Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer and/or Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

Repair Finished Unformed Surfaces that contain defects which affect durability of concrete. Surface defects, as such, including crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish patching compounds may be used when acceptable to Engineer and/or Architect.

Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and brush with a neat cement grout, apply or concrete bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.

Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut- out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and brush with neat cement grout, or apply concrete bonding agent. Mix dry- pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

Use epoxy-based mortar for structural repairs, where directed by Engineer and/or Architect.

Repair methods not specified above may be used, subject to acceptance of Engineer and/or Architect.

3.15 QUALITY CONTROL TESTING DURING CONSTRUCTION:

The City will employ a testing laboratory to perform other tests and to submit test reports.

Sampling and testing for quality control during placement of concrete may include the following, as directed by Engineer and/or Architect.

Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

Slump: ASTM C 143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.

Air Content: ASTM C 173, volumetric method for lightweight concrete; ASTM C 231 pressure for normal weight concrete; one for each set of compressive strength test specimens.

Concrete Temperature: Test hourly when air temperature is 40 degrees F (4 degrees C) and below, and when 80 degrees F (27 degrees C) and above; and each time a set of compression test specimens made.

Compression Test Specimen: ASTM C 31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

Compressive Strength Tests: ASTM C 39; one set for each 100 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 5,000 sq. ft. of surface area placed; 2 specimens tested at 7 days, 3 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

When total quantity of a given class of concrete is less than 50 cu. yds., strength test may be waived by Engineer and/or Architect if, in his judgement, adequate evidence of satisfactory strength is provided.

When strength of filed-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

Test results will be reported in writing to Engineer and/or Architect and Contractor on same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer and/or Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete if verified.

END OF SECTION 03300

SECTION 03450 - ARCHITECTURAL PRECAST CONCRETE - PLANT CAST

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes architectural precast concrete units, plant cast.

Related Sections: The following Sections contain requirements that relate to this Section:

Division 4 Section "Unit Masonry" for masonry facing, pointing mortar, and anchorages.

Division 7 Section "Flashing and Sheet Metal" for flashing receivers and reglets.

Division 7 Section "Joint Sealants" for elastomeric joint sealants and sealant backings.

PERFORMANCE REQUIREMENTS

Structural Performance: Engineer, fabricate, and install architectural precast concrete units to withstand design loads within limits and under conditions indicated.

Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data for architectural precast concrete units.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data and instructions for manufactured materials and products.

Shop Drawings prepared by or under the supervision of a qualified professional engineer detailing fabrication and installation of architectural precast concrete units. Indicate member locations, plans, elevations, dimensions, shapes, cross sections, and types of reinforcement, including special reinforcement. Include locations and details of hoisting points and lifting devices for handling and erection.

Indicate separate face and back-up mix locations and thicknesses.

Indicate welded connections by AWS standard symbols. Detail loose, cast-in, and field hardware, inserts, connections, and joints, including accessories.

Indicate locations and details of anchorage devices that are to be embedded in other construction.

For architectural precast concrete units indicated to comply with performance requirements, include engineering analysis data sealed and signed by the qualified professional engineer responsible for their preparation.

Design reference sample for initial selection, approximately 12 by 12 by 2 inches (300 by 300 by 50 mm), to illustrate quality of finishes, colors, and textures of exposed surfaces of architectural precast concrete units.

Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

VOC compliance certificates signed by manufacturers certifying compliance of their products with regulations of authorities having jurisdiction over volatile organic compounds (VOCs).

Design mixes for each concrete mix.

Material test reports from a qualified independent testing agency evidencing compliance with requirements of the following based on comprehensive testing of current materials:

Concrete materials.

Reinforcing materials.

Prestressing strands.

Admixtures.

Bearing pads.

Water-absorption test reports.

Material certificates in lieu of agency test reports, when permitted by Architect, signed by fabricator certifying that each material item complies with requirements.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced Installer who has completed architectural precast concrete work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Fabricator Qualifications: Engage a firm experienced in producing architectural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

Fabricator must participate in the Precast/Prestressed Concrete Institute's (PCI) Plant Certification Program and be designated a PCI Certified Plant for Group A1 - Architectural Concrete.

Fabricator shall be registered and approved by authorities having jurisdiction.

Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C 1077 and ASTM E 329, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of precast concrete units that are similar to that indicated for this Project in material, design, and extent.

PCI Design Standard: Comply with recommendations of PCI's MNL-120 "PCI Design Handbook--Precast and Prestressed Concrete" applicable to types of architectural precast concrete units indicated.

PCI Quality-Control Standard: Comply with requirements of PCI's MNL-117 "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products," including manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required.

ACI Publications: Comply with applicable provisions of the following ACI publications:

ACI 318 (ACI 318M) "Building Code Requirements for Reinforced Concrete."

Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.4 "Structural Welding Code--Reinforcing Steel."

Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

Calculated Fire-Test-Response Characteristics: When fire-resistance-rated assemblies are indicated, provide architectural precast concrete units whose fire resistance has been calculated according to PCI's MNL-124 "Design for Fire Resistance of Precast Prestressed Concrete" and is acceptable to authorities having jurisdiction.

Field samples, approximately 36 by 48 inches (900 by 1200 mm), of architectural precast concrete; in sets of 3 for each finish, color, and texture required, demonstrating the range of variations expected in these characteristics.

In presence of Architect, damage part of an exposed-face surface and demonstrate materials and methods proposed for repair of surface blemishes.

Design modifications may be made as necessary to meet field conditions and to ensure proper fitting of the Work as acceptable to Architect. Maintain general design concept shown without increasing or decreasing sizes of architectural precast concrete units or altering profiles and alignments shown. Revise and submit complete design calculations and Drawings prepared by a qualified professional engineer when design modifications are required.

Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

DELIVERY, STORAGE, AND HANDLING

Deliver precast concrete units to Project site in such quantities and at such times to ensure continuity of installation. Store units at Project site to prevent cracking, distorting, warping, staining, or other physical damage, and so that markings are visible.

Lift and support units only at designated lifting or supporting points shown on Shop Drawings.

SEQUENCING

Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

FABRICATORS

Available Fabricators: Subject to compliance with requirements, fabricators offering products that may be incorporated in the Work include, but are not limited to, the following:

Fabricators: Subject to compliance with requirements, provide products by one of the following:

MOLD MATERIALS

Forms: Provide forms and, where required, form-facing materials of metal, plastic, wood, or another acceptable material that is nonreactive with concrete and will produce required finish surfaces.

REINFORCING MATERIALS

Reinforcing Bars: ASTM A 615, Grade 60 (ASTM A 615M, Grade 400), deformed.

Low-Alloy-Steel Reinforcing Bars: ASTM A 706, Grade 60 (ASTM A 706M, Grade 400).

Galvanized Reinforcing Bars: ASTM A 767 (ASTM A 767M), Class II, 2 oz./sq. ft. (610 g/sq. m) zinc, hot-dip galvanized.

Steel-Welded Wire Fabric: ASTM A 185, plain, cold drawn.

PRESTRESSING TENDONS

Prestressing Strand: ASTM A 416, Grade 250 or 270, uncoated, 7-wire, low-relaxation strand.

CONCRETE MATERIALS

Portland Cement: ASTM C 150, Type I or Type III.

Use only one brand, type, and color of cement from the same mill throughout Project.

Standard gray portland cement may be used for nonexposed back-up concrete.

Normal-Weight Aggregates: ASTM C 33, with coarse aggregates meeting Class 5S and MNL-117 requirements.

Face-Mix Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining.

Gradation: Uniformly graded.
Gradation: Gap graded.

Face-Mix Fine Aggregates: Selected, natural or manufactured sand of the same material as coarse aggregate, unless otherwise acceptable to Architect.

Lightweight Aggregates: ASTM C 330.

Coloring Agent: ASTM C 979, synthetic mineral oxide pigments or colored water-reducing admixtures, color stable, nonfading, resistant to lime and other alkalis.

Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete.

Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

Water-Reducing Admixture: ASTM C 494, Type A.

Retarding Admixture: ASTM C 494, Type B.

Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

High-Range, Water-Reducing, and Retarding Admixture: ASTM C 494, Type G.

CONNECTION MATERIALS

Steel Shapes and Plates: ASTM A 36 (ASTM A 36M).

Malleable Iron Castings: ASTM A 47 (ASTM A 47M).

Carbon-Steel Plates: ASTM A 283 (ASTM A 283M).

High-Strength, Low-Alloy Structural Steel: ASTM A 572 (ASTM A 572M).

Carbon-Steel Structural Tubing: ASTM A 500, Grade B.

Wrought Carbon-Steel Bars: ASTM A 675, Grade 65 (ASTM A 675M, Grade 450).

Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.

High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.

Welded Headed Studs: AWS D1.1, Type B headed studs, cold-finished carbon-steel bars.

Deformed-Steel Wire Bar Anchors: ASTM A 496.

Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.

Stainless-Steel Bolts and Studs: ASTM F 593, alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers.

Hot-Dip Galvanized Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by the hot-dip process, complying with ASTM A 123 or ASTM A 153 as applicable.

Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.

Shop-Primed Finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements of SSPC-SP 3 and shop-apply primer according to SSPC-PA 1.

Primer: Fast-curing, lead- and chromate-free, VOC-conforming, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with SSPC-Paint 25 or the performance requirements of FS TT-P-664.

Welding Electrodes: Comply with AWS standards.

Accessories: Provide clips, hangers, plastic shims, and other accessories required to install architectural precast concrete units.

BEARING PADS

Provide bearing pads for architectural precast concrete units as follows:

Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 shore A durometer, minimum tensile strength 2250 psi (15.5 MPa) per ASTM D 412.

Random, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Surface hardness of 70 to 90 shore A durometer.

Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric, bonded in elastomer. Surface hardness of 80 to 100 shore A durometer.

Frictionless Pads: Tetrafluoroethylene (TFE), glass-fiber-reinforced, bonded to mild-steel plate, of type required for in-service stress.

High-Density Plastic: Multimonomer, nonleaching, plastic strip.

GROUT MATERIALS

Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

CONCRETE MIXES

Prepare design mixes for each type of concrete required.

Design mixes may be prepared by a qualified independent testing agency or by qualified architectural precast manufacturing plant personnel at architectural precast fabricator's option.

Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M).

Normal-Weight Concrete Face and Back-Up Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, using materials to be used on the Project, to provide normal-weight concrete with the following properties:

Compressive Strength (28-Day): 5000 psi (34.5 MPa).

Maximum Water-Cement Ratio at Point of Placement: 0.40.

Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content complying with MNL-117 requirements.

Water Absorption: 12 to 14 percent by volume tested according to MNL-117.

MOLDS

Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placing operations, temperature changes, and for pretensioning and detensioning operations.

Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

FABRICATION

Accurately position cast-in anchors, inserts, plates, angles, and other anchorage hardware for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect the position of the main reinforcement or the placing of concrete.

Supply loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes not provided by other trades necessary for securing architectural precast concrete units to supporting and adjacent members.

Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units to receive windows, cramps, dowels, reglets, waterstops, flashings, and other similar work as indicated. Coordinate with other trades for installation of cast-in items.

Cast-in openings larger than 10 inches (250 mm) in any dimension according to Shop Drawings. Other smaller holes may be field cut by trades requiring them when permitted by Architect.

Reinforcement: Comply with the recommendations of CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.

Accurately position, support, and secure reinforcement against displacement during concrete placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces. Do not use plastic-coated or uncoated metal chair supports.

Place reinforcement to maintain at least 3/4-inch (19-mm) minimum cover after finishing. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses.

Pretension tendons for architectural precast, prestressed concrete units either by single-strand tensioning method or multiple-strand tensioning method. Comply with MNL-117 requirements.

Mix concrete according to MNL-117 and requirements of this Section. Following concrete batching, no additional water may be added.

Place concrete in a continuous operation to prevent seams or planes of weakness from developing in precast units. Comply with requirements of MNL-117 for measuring, mixing, transporting, and placing concrete.

Place back-up concrete to ensure bond with face concrete.

Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with MNL-117.

Comply with ACI 306R procedures for cold-weather concrete placement.

Comply with ACI 305R procedures for hot-weather concrete placement.

Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint casting date on each architectural precast concrete unit on a surface that will not show in the finished structure.

Cure concrete according to the requirements of MNL-117 by moisture retention without heat or by accelerated heat curing, using low-pressure live steam or radiant heat and moisture.

Delay detensioning architectural precast, prestressed concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under the same conditions as the concrete.

Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true.

Edge and Corner Treatment: Uniformly chamfered.

Discard architectural precast concrete units that are warped, cracked, broken, spalled, stained, or otherwise defective unless repairs are permitted by Architect and meet requirements.

FABRICATION TOLERANCES

Comply with the following overall height and width dimensional tolerances of finished units measured at face adjacent to mold at time of casting:

10 Feet (3 m) or Less: Plus or minus 1/8 inch (3.2 mm).

10 to 20 Feet (3 to 6 m): Plus 1/8 inch (3.2 mm), minus 3/16 inch (5 mm).

Each Additional 10 Feet (3 m): Plus or minus 1/16 inch (1.6 mm) per 10 feet (3 m).

Angular Deviation of Plane of Side Mold: Plus or minus 1/32 inch (0.8 mm) per 3-inch (76-mm) depth or plus or minus 1/16-inch (1.6-mm) total, whichever is greater.

Openings Within One Unit: Plus or minus 1/4 inch (6 mm), except plus or minus 1/8 inch (3.2 mm) for windows and door frames.

Out of Square: Difference in length of two diagonal measurements of 1/8 inch (3.2 mm) per 72 inches (1829 mm) or 1/2-inch (12-mm) total, whichever is greater.

Thickness: Minus 1/8 inch (3.2 mm), plus 1/4 inch (6 mm).

Locations of Reveals and Architectural Features: Plus or minus 1/8 inch (3.2 mm).

Other Dimensional Tolerances: Numerically the greater of plus or minus 1/16 inch (1.6 mm) per 10 feet (3 m), or plus or minus 1/8 inch (3.2 mm).

Position Tolerances: For cast-in items measured from datum line, locations as shown on Shop Drawings as follows:

Inserts: Plus or minus 1/2 inch (12 mm).

Weld Plates: Plus or minus 1 inch (25 mm).

Handling Devices: Plus or minus 3 inches (76 mm).

Block Outs and Reinforcements: Within 1/4 inch (6 mm) of position shown on Shop Drawings, where such positions have structural implications or affect concrete cover; otherwise within plus or minus 1/2 inch (13 mm).

FINISHES

Finish exposed-face surfaces of architectural precast concrete units as follows to match Architect's design reference sample.

PCI and APA "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.

Smooth-surface finish free of pockets, sand streaks, and honeycombs, with uniform color and texture.

Finish exposed-back and exposed surfaces of architectural precast concrete units to match face-surface finish.

SOURCE QUALITY CONTROL

The Owner may employ an independent testing agency to evaluate architectural precast concrete fabricator's quality control and testing methods.

Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

Quality-Control Testing: Test and inspect architectural precast concrete according to MNL-117 requirements.

Strength of architectural precast concrete units will be considered deficient when they fail to comply with ACI 318 (ACI 318M) requirements.

Testing: When there is evidence that the strength of architectural precast concrete units may be deficient or may not meet ACI 318 (ACI 318M) requirements, the Owner will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42.

A minimum of 3 representative cores will be taken from architectural precast concrete units of suspect strength, from locations directed by Architect.

Cores will be tested in an air-dry condition.

Strength of concrete for each series of 3 cores will be considered satisfactory if the average compressive strength is equal to at least 85 percent of the 28-day design compressive strength and no single core is less than 75 percent of the 28-day design compressive strength.

Test results will be made in writing on the same day that tests are made, with copies to Architect, Contractor, and precast fabricator. Test reports will include the Project identification name and number, date, name of precast concrete fabricator, name of concrete testing agency; identification letter, name, and type of architectural precast concrete unit or units represented by core tests; design compressive strength, compressive strength at break and type of break, corrected for length-diameter ratio, and direction of applied load to core with respect to horizontal plane of concrete as placed.

Patching: Where core test results are satisfactory and architectural precast concrete units meet requirements, solidly fill core holes with patching mortar and finish to match adjacent concrete surfaces.

Defective Work: Discard architectural precast concrete units that do not conform to requirements, including strength, manufacturing tolerances, and finishes. Replace with architectural precast concrete units that meet requirements.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of architectural precast concrete units. Do not proceed with installation until unsatisfactory conditions have been corrected.

Do not install architectural precast units until supporting concrete has attained minimum allowable design compressive strength.

INSTALLATION

Install clips, hangers, and other accessories required for connecting architectural precast concrete units to supporting members and back-up materials.

Install architectural precast concrete units plumb, level, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.

Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.

Remove projecting hoisting devices and cement-grout fill recessed hoisting devices.

Anchor architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated. Remove temporary shims, wedges, and spacers as soon as possible after anchoring and grouting are completed.

Welding: Perform welding in compliance with AWS D1.1 and AWS D1.4, with qualified welders.

Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.

Repair damaged steel surfaces by cleaning and applying a coat of galvanizing repair paint to galvanized surfaces.

Repair damaged steel surfaces by cleaning and repriming damaged painted surfaces.

At bolted connections use lock washers or other acceptable means to prevent loosening of nuts.

Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.

ERECTION AND LOCATION TOLERANCES

Install architectural precast concrete units level, plumb, square, and true, without exceeding the recommended erection and location tolerances of MNL-117.

Erection Tolerances: Install architectural precast concrete units so that each unit after erection complies with following dimensional requirements:

Concave or convex bowing of any part of a flat surface not to exceed length of bow/360, with a maximum of 1 inch (25 mm) and up to 30 feet (9 m).

Maximum warpage of 1 corner out of plane of other 3, the greater of 1/16 inch (1.6 mm) per 12-inch (300-mm) distance from nearest adjacent corner.

Tolerances for Location of Architectural Precast Units: Fabricate and erect architectural precast concrete units so that joints between units do not exceed the following. Alignment for exterior units is outside face.

Face Width of Joints: Plus or minus 1/4 inch (6 mm).

Joint Taper: 1/40 inch per 12-inch length (1:480), with maximum length of taper over 10 feet (3 m) of 1/4 inch (6 mm).

Step in Face: 1/4 inch (6 mm).

Jog in Alignment of Edges: 1/4 inch (6 mm).

Jog in Alignment of Reveals: 1/4 inch (6 mm).

Plumb in Any 10 Feet (3 m) of Element Height: 1/4 inch (6 mm).

Variation from Level: Plus or minus 1/2 inch (13 mm) in any 40-foot (12-m) run.

Top Elevation from Nominal Top Elevation: Plus or minus 1/4 inch (6 mm) for exposed individual panel; 1/4 inch (6 mm) exposed relative to adjacent panel.

REPAIRS

Repair exposed exterior surfaces of architectural precast concrete units to match color, texture, and uniformity of surrounding concrete when permitted by Architect.

Remove and replace damaged architectural precast concrete units when repairs do not meet requirements.

CLEANING

Clean exposed surfaces of architectural precast concrete units after erection to remove weld marks, other markings, dirt, and stains.

Wash and rinse according to architectural precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.

Do not use cleaning materials or processes that could change the appearance of exposed architectural precast concrete finishes.

END OF SECTION 03450

SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Concrete unit masonry.

Related Sections: The following Sections contain requirements that relate to this Section:

Division 7 Section "Joint Sealants" for sealing joint in mockup.

Division 8 Section "Aluminum Architectural Windows" for window in mockup.

Division 10 Section "Louvers and Vents" for wall vents.

Products installed but not furnished under this Section include the following:

Steel lintels for unit masonry specified in Division 5 Section "Metal Fabrications."

Steel shelf angles for unit masonry specified in Division 5 Section "Metal Fabrications."

Wood nailers and blocking built into unit masonry specified in Division 6 Section "Rough Carpentry."

Manufactured reglets in masonry joints for metal flashing specified in Division 7 Section "Flashing and Sheet Metal."

Hollow metal frames in unit masonry openings specified in Division 8 Section "Standard Steel Doors and Frames."

Hollow metal frames in unit masonry openings specified in Division 8 Section "Custom Steel Doors and Frames."

PERFORMANCE REQUIREMENTS

Provide unit masonry that develops the following installed compressive strengths (f'm) at 28 days.

For Concrete Unit Masonry: As follows, based on net area:

f'm = 1900 psi (10.3 MPa).

As indicated.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product data for each different masonry unit, accessory, and other manufactured product specified.

Samples for initial selection of the following:

Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.

Colored-masonry mortar samples showing the full range of colors available.

Samples for verification of the following:

Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.

Colored-masonry mortar samples for each color required showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on the Project. Label samples to indicate type and amount of colorant used.

Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.

Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.

Each material and grade indicated for reinforcing bars.

Each type and size of joint reinforcement.

Each type and size of anchors, ties, and metal accessories.

Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:

Concrete masonary unit complying with ASTM C140.

Mortar complying with property requirements of ASTM C 270.

Mortar complying with BIA M1.

Grout mixes. Include description of type and proportions of grout ingredients per ASTMC 1019.

Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

QUALITY ASSURANCE

Owner will assign a qualified staff inspector to provide a survey and inspection of foundations for compliance with dimensional tolerances.

Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

Preconstruction Testing: Employ and pay a qualified independent testing agency to perform the following preconstruction testing to establish compliance of proposed materials and construction with specified requirements:

Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

DELIVERY, STORAGE, AND HANDLING

Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.

Store cementitious materials on elevated platforms, under cover, and in a dry location.

Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

PROJECT CONDITIONS

Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.

Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.

Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.

Protect sills, ledges, and projections from mortar droppings.

Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:

Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:

40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).

32 to 25 deg F (0 to -4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry.

Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:

40 to 25 deg F (4 to -4 deg C): Cover masonry with a weather-resistant membrane for 48 hours after construction.

Below 25 deg F do not erect masonry and/or apply mortar.

Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Concrete Masonry Units:

CONCRETE MASONRY UNITS

General: Provide shapes indicated and as follows for each form of concrete masonry unit required.

Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.

Provide square-edged units for outside corners, except where indicated as bullnose.

Concrete Masonry Units: ASTM C 90 and as follows:

Unit Compressive Strength: Provide units with minimum average net-area compressive strength indicated below:

1900 psi (13.1 MPa).

Not less than the unit compressive strengths required to produce concrete unit masonry construction of compressive strength indicated.

Weight Classification: Normal weight.

Provide Type II, nonmoisture-controlled units.

Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes indicated on Drawings:

8 inch (200 mm) nominal: 7-5/8 inch (194 mm) actual.

Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

Where units are to be left exposed, provide color and texture matching the range represented by Architect's sample.

MORTAR AND GROUT MATERIALS

Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

Mortar Cement: U.B.C. Standard No. 21-14.

For pigmented mortars, use premixed, colored mortar cements of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 5 percent of mortar cement by weight for mineral oxides nor 1 percent for carbon black.

For colored-aggregate mortars, use mortar cement of natural color or white as required to produce mortar color indicated.

Hydrated Lime: ASTM C 207, Type S.

Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

For pigmented mortars, use colored portland cement-lime mix of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.

Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.

White-Mortar Aggregates: Natural white sand or ground white stone.

Aggregate for Grout: ASTM C 404.

Mortar Pigments for Split Faced Units: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars. Color selected from full range of manufacturer standard colors.

Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.

Water Repellant Admixture: Liquid water-repellent motar admixture intended for use with split faced CMU, containing integral water-repellent by same manufacturer.

Water: Potable.

JOINT REINFORCEMENT

ASTM A 153, Class B-2, for both interior and exterior walls.

Galvanize wire, ASTM A 580, Type 304 or 316.

Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet (3 m), with prefabricated corner and tee units, and complying with requirements indicated below:

Wire Diameter for Side Rods: 0.1483 inch (3.8 mm).

Wire Diameter for Cross Rods: 0.1483 inch (3.8 mm).

For single-wythe masonry, provide type as follows with single pair of side rods:

Ladder design with perpendicular cross rods spaced not more than 16 inches (407 mm) o.c.

For double-wythe masonry, provide type as follows with double pair of side rods:

Ladder design with hook and eye (16" o.c. horizontally and vertically) for veneer perpindicular cross roads spaced not more than 16 inches o.c.

Use where horizontal joints of facing wythe do not align with those of back-up and where indicated.

Use where facing wythe is of different material than back-up wythe.

MISCELLANEOUS MASONRY ACCESSORIES

Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from the following material:

Neoprene.

Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

Styrene-Butadiene Rubber Compound: ASTM D 2000, Designation M2AA-805.

or

Polyvinyl Chloride: ASTM D 2287, General Purpose Grade, Type PVC-65406.

Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

INSULATION

Extruded Polystyrene Board Insulation: Rigid, cellular, polystyrene thermal insulation with closed cells and integral high-density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578, Type IV; in manufacturer's standard lengths and widths; and in thicknesses indicated.

Adhesive: Type recommended by insulation board manufacturer for application indicated.

MASONRY CLEANERS

Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.

For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.

Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:

Sure Klean Vana Trol; ProSoCo, Inc.

MORTAR AND GROUT MIXES

General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

Do not use calcium chloride in mortar or grout.

Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, in order to ensure that mortar color is consistent.

Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for job-mixed mortar; and ASTM C 1142 for ready-mixed mortar, of types indicated below:

Limit cementitious materials in mortar to portland cement and lime.

For masonry below grade, in contact with earth, and where indicated, use type indicated below:

Type: S.

For reinforced masonry and where indicated, use type indicated below:

Type: S.

For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions, and for other applications where another type is not indicated, use type indicated below:

Type: N.

Grout for Unit Masonry: Comply with ASTM C 476. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.

Use fine grout in grout spaces less than 2 inches (50 mm) in horizontal dimension, unless otherwise indicated.

Use coarse grout in grout spaces 2 inches (50 mm) or more in least horizontal dimension, unless otherwise indicated.

Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's directions.

PART 3 - EXECUTION

EXAMINATION

Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.

Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

INSTALLATION, GENERAL

Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.

Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.

Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.

Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

CONSTRUCTION TOLERANCES

Variation from Plumb: For vertical lines and surfaces of columns, walls, and arrises, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), nor 3/8 inch in 20 feet (10 mm in 6 m), nor 1/2 inch in 40 feet (12 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch in 40 feet (12 mm in 12 m) or more. For vertical alignment of head joints, do not exceed plus or minus 1/4 inch in 10 feet (6 mm in 3 m), nor 1/2 inch (12 mm) maximum.

Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch in 40 feet (12 mm in 12 m) or more. For top surface of bearing walls, do not exceed 1/8 inch (3 mm) in 10 feet (3 m), nor 1/16 inch (1.5 mm) within width of a single unit.

Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet (12 mm in 6 m), nor 3/4 inch in 40 feet (19 mm in 12 m) or more.

Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch (6 mm) nor plus 1/2 inch (12 mm).

Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch (3 mm). Do not vary from
head-joint thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch (3 mm). Do not vary from collar-joint thickness indicated by more than minus 1/4 inch (6 mm) or plus 3/8 inch (10 mm).

LAYING MASONRY WALLS

Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

One-half running bond with vertical joint in each course centered on units in courses above and below.

Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.

Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.

At exterior frames, insert extruded polystyrene board insulation around perimeter of frame in thickness indicated, but not less than 3/4 inch (19 mm) to act as a thermal break between frame and masonry.

Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

MORTAR BEDDING AND JOINTING

Lay hollow concrete masonry units as follows:

With full mortar coverage on horizontal and vertical face shells.

Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.

For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch (10-mm) joints.

Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

For glazed masonry units, use a nonmetallic jointer 3/4 inch (19 mm) or more in width.

Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

HORIZONTAL-JOINT REINFORCEMENT

General: Provide continuous horizontal-joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcing a minimum of 6 inches (150 mm). Start at finish floor.

Space reinforcement not more than 16 inches (406 mm) o.c.

Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.

Provide reinforcement in mortar joint 1 block course above and below wall openings and extending 12 inches (305 mm) beyond opening.

Reinforcement above is in addition to continuous reinforcement.

Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

CONTROL AND EXPANSION JOINTS

General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

Form control joints in concrete masonry as follows:

Fit bond-breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.

Install preformed control-joint gaskets designed to fit standard sash block.

Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake joint.

Install temporary foam plastic filler in head joints and remove when unit masonry is complete.

LINTELS

Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick size units and 24 inches (610 mm) for block size units are shown without structural steel or other supporting lintels.

Provide either of above at Contractor's option or provide precast or formed-in-place concrete lintels complying with requirements of Division 3 Section "Cast-in-Place Concrete."

Provide minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.

Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

Do not exceed the following pour heights for fine grout:

For minimum widths of grout spaces of 3/4 inch (19 mm) or for minimum grout space of hollow unit cells of 1-1/2 by 2 inches (38 by 51 mm), pour height of 12 inches (305 mm).

For minimum widths of grout spaces of 2 inches (51 mm) or for minimum grout space of hollow unit cells of 2 by 3 inches (51 by 76 mm), pour height of 60 inches (1524 mm).

For minimum widths of grout spaces of 2-1/2 inches (63 mm) or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches (63 by 76 mm), pour height of 12 feet (3.6 m).

For minimum widths of grout spaces of 3 inches (76 mm) or for minimum grout space of hollow unit cells of 3 by 3 inches (76 by 76 mm), pour height of 24 feet (7.3 m).

Do not exceed the following pour heights for coarse grout:

For minimum widths of grout spaces of 1-1/2 inches (38 mm) or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches (38 by 76 mm), pour height of 12 inches (305 mm).

For minimum widths of grout spaces of 2 inches (51 mm) or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches (63 by 76 mm), pour height of 60 inches (1524 mm).

For minimum widths of grout spaces of 2-1/2 inches (63 mm) or for minimum grout space of hollow unit cells of 3 by 3 inches (76 by 76 mm), pour height of 12 feet (3.6 m).

For minimum widths of grout spaces of 3 inches (76 mm) or for minimum grout space of hollow unit cells of 3 by 4 inches (76 by 101 mm), pour height of 24 feet (7.3 m).

Provide cleanout holes at least 3 inches (76 mm) in least dimension for grout pours over 60 inches (1524 mm) in height.

Provide cleanout holes at each vertical reinforcing bar.

At solid grouted masonry, provide cleanout holes at not more than 32 inches (813 mm) o.c.

REPAIRING, POINTING, AND CLEANING

Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.

Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.

In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.

Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.

Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.

Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 04200

NATURAL THIN VENEER STONE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Natural thin veneer stone for [exterior] [and] [interior] vertical surfaces.

1.2 RELATED SECTIONS

A. Section 04810 (04 22 00) – Unit Masonry Assemblies (Concrete Unit Masonry): Masonry supporting walls.

B. Section 07900 (07 90 00) – Joint Sealers (Joint Protection): Sealant and joint filler for perimeter and control joints.

C. Section 09220 (09 24 00) – Portland Cement Plaster (Portland Cement Plastering): Metal lath and scratch coat back-up over supporting walls.

1.3 REFERENCES

A. ACI 530.1/ASCE 6/TMS 602 – Specifications for Masonry Structures.

B. ANSI A118.4 – Specifications for Latex-Portland Cement Mortar.

C. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.

D. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.

E. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.

F. ASTM C 568 – Standard Specification for Limestone Dimension Stone.

G. ASTM C 615 – Standard Specification for Granite Dimension Stone.

H. ASTM C 616 – Standard Specification for Quartz Based Dimension Stone.

I. ASTM C 979 – Standard Specification for Pigments for Integrally Colored Concrete.

J. PCA – Portland Cement Plaster (Stucco) Manual.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data on stone, mortar products, and sealant products, including:
   1. Surface preparation and installation instructions.
   2. Storage and handling instructions.

B. Shop Drawings: Submit manufacturer’s shop drawings, including plans, elevations, sections, and details, indicating layout, dimensions, anchorages, and jointing methods.

C. Selection Samples: Submit mortar color samples.

D. Verification Samples: Submit 2 manufacturer's full-size samples of natural thin veneer stone for each pattern specified.

E. Warranty: Submit manufacturer's standard warranty for natural thin veneer stone.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer regularly engaged, for preceding 10 years, in manufacture of natural thin veneer stone of similar type to that specified.

B. Mock-Ups: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage:
   1. Store materials in accordance with manufacturer's instructions.
   2. Store materials in manufacturer's unopened packaging until ready for installation.
   3. Store stone materials on pallets on dry, level surface and cover with tarps.
   4. Do not stack pallets.
   5. Mortar: Store mortar under cover in area where air temperature is maintained between 40 degrees F and 110 degrees F (4 degrees C and 43 degrees C).

C. Handling: Protect materials during handling and installation to prevent damage or contamination.

1.7 PROJECT ENVIRONMENTAL REQUIREMENTS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install natural thin veneer stone under environmental conditions outside manufacturer's limits.

B. Hot and Cold Weather Requirements: ACI 530.1/ASCE 6/TMS 602.

C. Air Temperature: 40 degrees F (4 degrees C) or above during installation of natural thin veneer stone.

D. Mortar Mixing Water: Heat mortar mixing water when air temperature falls below 50 degrees F (10 degrees C).

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Natural Stone Veneers International, Inc., PO Box 347, Fond du Lac, Wisconsin 54936. Toll Free (877) 923-2800. Phone (920) 923-2800. Fax (920) 923-3800. Website www.nsvi.com. E-mail info@nsvi.com. or equal.

2.2 NATURAL THIN VENEER STONE

A. Collection: “Traditional”.
   1. Pattern: “Westminster”.
      a. Height: 2 inches to 8 inches (51 mm to 203 mm).
      b. Length: 6 inches to 18 inches (152 mm to 457 mm).
      c. Nominal thickness: 3/4 inch to 1-1/2 inches (19 mm to 38 mm).
      d. Color: Gray tones with soft aged appearance.
      e. Material: Limestone, rated as Type-II Medium Density when tested in accordance with ASTM C 568.

2.3 SPECIAL SHAPES

A. Provide special shapes as indicated on the Drawings and as follows:
   1. Trimstones.
   2. Sills

B. Color: As selected from manufacturer standard range.

2.4 ACCESSORIES

A. Concrete Bonding Agent: Latex type.

B. Setting Buttons and Shims: Lead or plastic.

C. Joint Sealants and Joint Fillers: As specified in Section 07900 (07 90 00).

2.5 MORTAR

A. Mortar:
   1. Cement: ASTM C 270.
   2. Lime: ASTM C 207.
   3. Sand: ASTM C 144, natural or manufactured.
   4. Color Pigments: ASTM C 979, mineral oxide.
   5. Water: Potable.
   6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.

B. Bonding Agent: Acrylic additive.

C. Sealer: Water-based silane or siloxane masonry sealer, [clear] [semi-gloss].

D. Mortar Mixes:

1. Grouted Joints:
   a. Mix Mortar: ASTM C 270, Type S.
   b. Add color pigments to mortar in accordance with pigment manufacturer's instructions.
2. Jointless Dry-Stack Installation:
   a. Mix mortar in accordance with ANSI A118.4.
   b. Add color pigments in accordance with pigment manufacturer's instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive natural thin veneer stone.

B. Notify Architect of conditions that would adversely affect installation.

C. Do not begin surface preparation or installation until unacceptable conditions are corrected.

D. Do not begin installation until backing structure is plumb, bearing surfaces are level, and substrates are clean and properly prepared.

E. Verify location and secure installation if shelf angles are required.

3.2 SURFACE PREPARATION

A. Prepare surfaces in accordance with manufacturer's instructions.

B. Clean surfaces thoroughly before installation.

C. Prepare surfaces using methods for achieving best results for substrate under project conditions.

D. Prepare for Installation Over Concrete Masonry Units: Adhere stone directly to concrete masonry units with mortar.

E. Application of Base Coat Stucco:
1. Apply scratch coat in accordance with PCA Plaster (Stucco) Manual.
2. Apply scratch coat to nominal thickness of 1/2 inch to 3/4 inch (13 mm to 19 mm) over metal lath surfaces.
3. If weather is hot or surface is dry, dampen previous coat before applying mortar and thin stone veneer.
4. If scratch coat is done in advance, use notch trowel to create texture for better bond. Smooth surface is not acceptable for bond.

F. Prepare for Installation of Thin Veneer Stone:
1. Coordination: Coordinate placement of reinforcement, anchors, accessories, flashings, weep holes, and other moisture-control products specified in other sections.
2. Cleaning: Clean built-in items of loose rust, ice, mud, and other foreign matter before incorporating into wall.

3. Prime or galvanize ferrous metal built into wall.
4. Temporary Bracing:
   a. Provide temporary bracing as required during installation of masonry.
   b. Maintain bracing in place until building structure provides permanent support.

3.3 INSTALLATION

A. Install thin veneer stone and mortar in accordance with manufacturer's instructions and ACI 530.1/ASCE 6/TMS 602.

B. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.

C. Pattern Bond:
1. Lay out work in advance and distribute color range of stone uniformly over total work area.
2. Lay stone with face exposed.
3. Take care to avoid concentration of any 1 color to any 1 wall surface.
4. Maintain approximate 1/2-inch (13-mm) joint, as stone allows.
5. Do not use stacked vertical joints.

D. Placing and Bonding:
1 Dampen substrate as required to reduce excessive suction.
2. Apply mortar in accordance with PCA Plaster (Stucco) Manual to thickness of 1/2 inch to 3/4 inch (13 mm to 19 mm).
3. Do not spread more than workable area of 5 to 10 square feet, so mortar will not set before stone is applied.
4. Lay thin veneer stone in full bed of mortar with full head joints.
5. Work from bottom up, laying corner pieces first.
6. Remove excessive mortar as work progresses.
7. Do not shift or tap veneer stone after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
8. Isolate top of veneer stone from horizontal structural framing members and slabs or decks with compressible joint filler and sealant as specified in Section 07900 (07 90 00).

E. Joining Work: Where fresh masonry joins partially set masonry.
1. Remove loose stone and mortar.
2. Clean and lightly wet surface of set masonry.
3. To avoid horizontal run of masonry, rack back 1/2 the length of stone in each course.
4. Toothing is not permitted.

F. Joints:
1. Lay stone with approximate 1/2-inch (13-mm) mortar joint, as stone allows.
2. Tool joints when "thumb-print" hard with round jointer, slightly larger than width of joint.
3. Trowel point or concave tool exterior joints below grade.
4. Flush cut joints to be finished with soft brush only.
5. Retempering of mortar is not permitted.
6. Use non-corrosive stone shims as required to maintain uniform joint thickness.

G. Control and Expansion Joints:
1. Keep joints open and free of debris.
2. Coordinate control joints as specified in Section 07900 (07 90 00) for sealant performance.

H. Sealant Recesses:
   1. Provide open joints 3/4 inch (19 mm) deep and 1/4 inch (6 mm) wide, where masonry meets doors, windows, and other exterior openings.
   2. Coordinate sealant joints as specified in Section 07900 (07 90 00) for sealant performance.

I. Cutting and Fitting:
   1. Cut and fit thin veneer stone for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials.
   2. Coordinate with other work to provide correct size, shape, and location.

J. During progress of the work, cover top of unfinished stone masonry work for protection from weather.

3.5 CLEANING

A. Keep face of stone free of mortar as work progresses.

B. If residual mortar is on face of stone, allow to dry partially and brush mortar off surface and sponge off residue.

C. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild masonry detergent acceptable to natural thin veneer stone manufacturer.

D. Do not use harsh cleaning materials or methods that could damage stone.

E. Do not use metal brushes or acids for cleaning.

3.6 PROTECTION

A. Protect installed natural thin veneer stone to ensure that, except for normal weathering, stone will be without damage or deterioration at time of Substantial Completion.

B. Touch-up, repair, or replace damaged stone before Substantial Completion.

END OF SECTION

SECTION 05400 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Interior nonload-bearing steel-stud walls.

Related Sections: The following Sections contain requirements that relate to this Section:

Division 9 Section "Gypsum Board Assemblies" for gypsum board and nonload-bearing metal-stud framing and ceiling-suspension assemblies.

PERFORMANCE REQUIREMENTS

AISI "Specifications": Calculate structural characteristics of cold-formed metal framing according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members".

Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

Design Loads: As indicated.

Design framing systems to withstand design loads without deflections greater than the following:

Interior New Load-Bearing Walls: Lateral deflection of 1/240 of the wall height.

Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product data for each type of cold-formed metal framing, accessory, and product specified.

Shop drawings showing sizes, thicknesses, and types of cold-formed metal framing, fabrication, fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachments to other units of Work.

Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names
and addresses of architects and owners, and other information specified.

Product test reports from a qualified independent testing agency evidencing compliance with requirements of the following based on comprehensive testing:

Expansion anchors.

Powder-actuated anchors.

Mechanical fasteners.

Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence cold-formed metal framing's compliance with building code in effect for Project.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced Installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Fire-Test-Response Characteristics: Where fire-resistance-rated assemblies are indicated, provide cold-formed metal framing identical to that tested as part of an assembly for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

Fire-Resistance Ratings: As indicated by design designations listed in UL "Fire Resistance Directory," or by Warnock Hersey or another testing and inspecting agency acceptable to authorities having jurisdiction.

Professional Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of cold-formed metal framing similar to this Project in material, design, and extent and that have a record of successful in-service performance.

Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1.

DELIVERY, STORAGE, AND HANDLING

Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated in the Work include, but are not limited to, the following:

Dale Industries, Inc.
Dietrich Industries, Inc.
Unimast, Inc.

MATERIALS

Galvanized-Steel Sheet: ASTM A 446, zinc coated according to ASTM A 525, and as follows:

Coating Designation: G 60.

Prime-Painted Steel Sheet: ASTM A 570 or ASTM A 611, cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free, rust-inhibitive primer conforming to the performance requirements of FS TT-P-664.

Grade: As required by structural performance.

WALL FRAMING

Steel Studs: Manufacturer's standard C-shaped steel studs of web depths indicated, with lipped flanges, and complying with the following:

Stud gauge	25 ga. interior, 20 ga. exterior.
Stud size	3-5/8 interior, as indicated on drawings – for exterior.

Web: Punched.

Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges, and complying with the following:

Design Uncoated-Steel Thickness: Matching steel studs.

Flange Width: 2-1/2 inches (63 mm).

FRAMING ACCESSORIES

Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.

Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

Supplementary framing.

Bracing, bridging, and solid blocking. Provide solid blocking for all cabinets, handrails, mouldings and building components that require proper substrate for attachment. Solid blocking shall be a minimum 2 x 6. Provide PT in all wet areas.

Web stiffeners.

Gusset plates.

Deflection track and vertical slide clips.

Stud kickers and girts.

Joist hangers and end closures.

Reinforcement plates.

ANCHORS, CLIPS, AND FASTENERS

Steel Shapes and Clips: ASTM A 36 (ASTM A 36M), zinc coated by the hot-dip process according to ASTM A 123.

Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.

Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

Welding Electrodes: Comply with AWS standards.

MISCELLANEOUS MATERIALS

Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and a 30-minute working time.

Thermal Insulation: ASTM C 665, Type I, faced mineral-fiber blankets produced by combining glass or slag fibers with thermosetting resins. Thermal resistance of R-19, roll size 24 inch, flame/smoke properties 25/50 in accordance with ASTM E84.

FABRICATION

Fabricate cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.

Fabricate framing assemblies in jig templates.

Cut framing members by sawing or shearing; do not torch cut.

Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to manufacturer's recommendations.

Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or distortion.

Fabrication Tolerances: Fabricate assemblies to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

EXAMINATION

Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

PREPARATION

Existing sprayed-on fireproofing remove only as much fireproofing as needed to complete installation of cold-formed framing without reducing thickness of fireproofing below that required to obtain fire-resistance rating indicated. Protect remaining fireproofing from damage.

Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

INSTALLATION, GENERAL

Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.

Cut framing members by sawing or shearing; do not torch cut.

Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

Locate mechanical fasteners and install according to cold-framed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

Provide temporary bracing and leave in place until framing is permanently stabilized.

Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

Install insulation in framing members, such as headers, sills, boxed joists, and double studs, inaccessible upon completion of framing work.

Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:

Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

FIELD QUALITY CONTROL

Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality-control testing.
Field and shop welds will be subject to inspection and testing.

Testing agency will report test results promptly and in writing to Contractor and Architect.

Remove and replace Work that does not comply with specified requirements.

Additional testing will be performed to determine compliance of corrected Work with specified requirements.

REPAIRS AND PROTECTION

Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.

Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed prime-painted, cold-formed metal framing.

Touchup painted surfaces with same type of shop paint used on adjacent surfaces.

Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 05400

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

- Framing with dimension lumber.
- Framing with timbers.
- Framing with engineered wood products.
- Rooftop equipment bases and support curbs.
- Wood furring, grounds, nailers, and blocking.
- Sheathing.
- Subflooring.
- Underlayment.
- Utility shelving.

Related Sections: The following Sections contain requirements that relate to this Section:

DEFINITIONS

Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.

Exposed Framing: Dimension lumber not concealed by other construction and indicated to receive a stained or natural finish.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data for the following products:

- Engineered wood products.
- Underlayment.
- Insulating sheathing.
- Air-infiltration barriers.

Metal framing anchors.

Construction adhesives.

Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee's (ALSC) Board of Review.

Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:

For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.

For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

Warranty of chemical treatment manufacturer for each type of treatment.

Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

Engineered wood products.

Foam-plastic sheathing.

Air-infiltration barriers.

Metal framing anchors.

Power-driven fasteners.

Fire-retardant-treated wood.

QUALITY ASSURANCE

Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer.

Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by a single producer.

DELIVERY, STORAGE, AND HANDLING

Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Wood-Preservative-Treated Materials:

Baxter: J. H. Baxter Co.
Chemical Specialties, Inc.
Continental Wood Preservers, Inc.
Hickson Corp.
Hoover Treated Wood Products, Inc.
Osmose Wood Preserving, Inc.

Fire-Retardant-Treated Materials, Exterior Type:

American Wood Treaters, Inc.
Hoover Treated Wood Products, Inc.

Gypsum Sheathing Board:

Domtar Gypsum.
Georgia-Pacific Corp.
National Gypsum Co.; Gold Bond Building Products Division.
United States Gypsum Co.

Glass-Fiber-Surfaced Gypsum Sheathing Board:

Georgia-Pacific Corp.
United States Gypsum Co.

Air-Infiltration Barriers:

Amoco Foam Products Co.
Anthony Industries, Inc.; Simplex Products Division.

Celotex Corporation (The); Building Products Division.
DuPont Company; Fibers Department.
Parsec, Inc.
Raven Industries, Inc.
Reemay, Inc.
Sto-Cote Products, Inc.

Metal Framing Anchors:

Cleveland Steel Specialty Co.
Harlen Metal Products, Inc.
Silver Metal Products, Inc.
Simpson Strong-Tie Company, Inc.
Southeastern Metals Manufacturing Co., Inc.

LUMBER, GENERAL

Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

NELMA - Northeastern Lumber Manufacturers Association.

NLGA - National Lumber Grades Authority (Canadian).

RIS - Redwood Inspection Service.

SPIB - Southern Pine Inspection Bureau.

WCLIB - West Coast Lumber Inspection Bureau.

WWPA - Western Wood Products Association.

Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.

Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.

Provide dressed lumber, S4S, unless otherwise indicated.

Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

WOOD-PRESERVATIVE-TREATED MATERIALS

General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

Do not use chemicals containing chromium or arsenic.

For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m). After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

Wood framing members less than 18 inches (460 mm) above grade.

Wood floor plates installed over concrete slabs directly in contact with earth.

Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).

Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

FIRE-RETARDANT-TREATED MATERIALS

General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.

Research or Evaluation Reports: Provide fire-retardant-treated wood acceptable to authorities having jurisdiction and for which a current model code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated.

For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

Exterior Type: Use for exterior locations and where indicated.

Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

DIMENSION LUMBER

General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

Non-Load-Bearing Interior Partitions: Provide framing of the following grade and species:

Grade: Construction, Stud, or No. 3.

Species: Southern pine; SPIB.

Exterior and Load-Bearing Walls: Provide framing of the following grade and species:

Framing Other than Non-Load-Bearing Partitions: Provide framing of the following grade and species:

Grade: No. 2.

Species: Southern pine; SPIB.

Ceilings (Non-Load-Bearing): For ceiling framing that does not support a floor, roof, or attic, provide the following grade and species:

Grade: No. 2.

Species: Southern pine; SPIB.

Other Framing Not Listed Above: Provide the following grades and species:

Grade: Construction or No. 2.

Species: Southern pine; SPIB.

Exposed Framing: Provide material hand-selected from lumber of species and grade indicated below for uniformity of appearance and freedom from characteristics that would impair finish appearance.

Species and Grade: Southern pine, Select Structural; SPIB.

MISCELLANEOUS LUMBER

General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

Grade: For dimension lumber sizes, provide No. 2 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 2 grade per SPIB.

ENGINEERED WOOD PRODUCTS

General: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence compliance with building code in effect for Project.

Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

General: Where structural-use panels are indicated for the following concealed types of applications, provide APA-performance-rated panels complying with requirements designated under each application for grade, span rating, exposure durability classification, and edge detail (where applicable).

Thickness: Provide panels meeting requirements specified but not less than thickness indicated.

Span Ratings: Provide panels with span ratings required to meet "Code Plus" provisions of APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial."

Wall Sheathing: APA-rated sheathing.

Span Rating: As required to suit stud spacing indicated.

Roof Sheathing: APA-rated sheathing.

Exposure Durability Classification: Exterior.

GYPSUM SHEATHING

Gypsum Sheathing Board: Water-resistant-core gypsum sheathing board complying with ASTM C 79 with long edges surfaced with water-repellent paper and as follows:

Type: Regular or
Type: X as required.

Edge Configuration: Square, for vertical application.

Thickness: 5/8 inch (15.9 mm).

Glass-Fiber-Surfaced Gypsum Sheathing Board: Gypsum sheathing board consisting of noncombustible gypsum core incorporating a water-resistant material, surfaced on face and back with glass-fiber mats with alkali-resistant coating, and with unsurfaced square edges; complying with ASTM C 79, and requirements indicated below:

Type: Regular.

Thickness: 5/8 inch (15.9 mm).

AIR-INFILTRATION BARRIER

Asphalt-saturated organic felt complying with ASTM D 226, Type I (No. 15 asphalt felt), unperforated.

Air retarder complying with ASTM E 1677; made from polyolefins; either cross-laminated films, woven strands, or spunbonded fibers; coated or uncoated; with or without perforations to transmit water vapor but not liquid water; and as follows:

Minimum Thickness: 6 mils (0.08 mm).

Minimum Water-Vapor Transmission: 10 perms (575 ng/Pa x s x sq. m) when tested according to ASTM E 96,

Procedure A.

Maximum Flame Spread: 25 per ASTM E 84.

Minimum Allowable Exposure Time: 3 months.

FASTENERS

General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

Nails, Wire, Brads, and Staples: FS FF-N-105.

Power-Driven Fasteners: CABO NER-272.

Wood Screws: ASME B18.6.1.

Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M)

Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

METAL FRAMING ANCHORS

General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:

Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.

Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

Joist Hangers: U-shaped joist hangers with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm-) wide nailing flanges at least 85 percent of joist depth.

Thickness: 0.052 inch (1.3 mm).
Thickness: 0.064 inch (1.6 mm).

Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

Strap Width: 1-1/2 inches (38 mm).
Strap Width: 2 inches (50 mm).

Thickness: 0.052 inch (1.3 mm).
Thickness: 0.064 inch (1.6 mm).

Bridging: Rigid, V-section, nailless type, 0.064 inch (1.6 mm) thick, length to suit joist size and spacing.

MISCELLANEOUS MATERIALS (as required)

Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbonate (IPBC) as its active ingredient.

PART 3 - EXECUTION

INSTALLATION, GENERAL

Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

CABO NER-272 for power-driven staples, P-nails, and allied fasteners.

Published requirements of metal framing anchor manufacturer.

"Recommended Nailing Schedule" of referenced framing standard and with AFPA's "National Design Specifications for Wood Construction."

"Table 23-I-Q--Nailing Schedule" of the Uniform Building Code.

"Table 2305.2--Fastening Schedule" of the BOCA National Building Code.

"Table 1705.1--Fastening Schedule," of the Standard Building Code.

Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

Use hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of

high relative humidity.

Countersink nail heads on exposed carpentry work and fill holes with wood filler.

WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

WOOD FURRING

Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

Firestop furred spaces of walls at each floor level and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

Furring to Receive Plywood Paneling: Install 1-by-3-inch nominal- (19-by-63-mm actual-) size furring at 24 inches (610 mm) o.c., horizontally and vertically. Select furring with no knots capable of producing bent-over nails and damage to paneling.

Furring to Receive Plywood Paneling: Install 19-by-63-mm actual-size furring at 600 mm o.c., horizontally and vertically. Select furring with no knots capable of producing bent-over nails and damage to paneling.

Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring at 16 inches (406 mm) o.c., vertically.

Furring to Receive Gypsum Board: Install 19-by-38-mm actual-size furring at 400 mm o.c., vertically.

Furring to Receive Plaster Lath: Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring at 16 inches (406 mm) o.c., vertically.

Furring to Receive Plaster Lath: Install 19-by-38-mm actual-size furring at 400 mm o.c., vertically.

WOOD FRAMING, GENERAL

Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.

Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

Install framing members of size and at spacing indicated.

Do not splice structural members between supports.

Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where firestopping is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal- (38-mm actual-)

thickness lumber of same width as framing members.

WALL AND PARTITION FRAMING

General: Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs; except single top plate may be used for non-load-bearing partitions. Nail or anchor plates to supporting construction, unless otherwise indicated.

For interior partitions and walls, provide 2-by-4-inch nominal- (38-by-89-mm actual-) size wood studs spaced 16 inches (406 mm) o.c., except where otherwise indicated or required.

For interior partitions and walls, provide 38-by-89-mm actual-size wood studs spaced 400 mm o.c., except where otherwise indicated or required.

Construct corners and intersections with 3 or more studs. Provide miscellaneous blocking and framing as shown and as required to support facing materials, fixtures, specialty items, and trim.

Provide continuous horizontal blocking at midheight of single-story partitions over 96 inches (2438 mm) high and multistory partitions, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.

Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.

For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal (89-mm actual) depth for openings 36 inches (900 mm) and less in width, and not less than 6-inch nominal (140-mm actual) depth for wider openings.

For load-bearing walls, provide double-jamb studs for openings 72 inches (1800 mm) and less in width, and triple-jamb studs for wider openings. Provide headers of depth shown or, if not shown, as recommended by AFPA's "Manual for Wood Frame Construction."

Provide bracing in exterior walls, at both walls of each external corner, full-story height, unless otherwise indicated. Provide one of the following:

Provide bracing in walls, at locations indicated, full-story height, unless otherwise indicated. Provide one of the following:

Diagonal bracing at 45-degree angle using let-in 1-by-4-inch nominal- (19-by-89-mm actual-) size boards.

Diagonal bracing at 45-degree angle using metal bracing.

Plywood panels, not less than 48 by 96 inches (1219 by 2438 mm) applied vertically.

Performance-rated structural-use panels, not less than 48 by 96 inches (1219 by 2438 mm) applied vertically.

Particleboard sheathing panels, not less than 48 by 96 inches (1219 by 2438 mm) applied vertically.

In lieu of bracing at corners or at locations indicated, continuous gypsum sheathing may be provided in panels not less than 48 by 96 inches (1219 by 2438 mm) applied vertically.

In lieu of bracing at corners or at locations indicated, continuous fiberboard sheathing, intermediate type, may be provided in panels not less than 48 by 96 inches (1219 by 2438 mm) applied vertically.

GYPSUM SHEATHING

General: Fasten gypsum sheathing to supports with galvanized roofing nails or divergent point galvanized staples. Nail or staple to comply with manufacturer's recommended spacing and referenced fastening schedule. Keep perimeter fasteners 3/8 inch (10 mm) from edges and ends of units. Fit units tightly against each other and around openings.

Install 24-by-96-inch (609-by-2438-mm) sheathing horizontally with long edges at right angles to studs with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent board without forcing. Abut ends of boards over centers of studs and stagger end joints of adjacent boards not less than 1 stud spacing, 2 where possible.

Install 48-by-96-inch (1219-by-2438-mm) or longer sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing.

FIBERBOARD SHEATHING

Fasten fiberboard sheathing panels to intermediate supports and then at edges and ends. Use galvanized roofing nails or galvanized staples. Nail or staple to comply with manufacturer's recommended spacing and referenced fastening schedule. Drive fasteners flush with surface of sheathing and locate perimeter fasteners at least 3/8 inch (10 mm) from edges and ends.

Install 48-by-96-inch (1219-by-2438-mm) or longer sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Allow 1/8-inch (3-mm) open space between edges and ends of adjacent units. Stagger horizontal joints, if any.

Apply air-infiltration barrier over sheathing as soon as practical after installation to prevent deterioration from wetting.

AIR-INFILTRATION BARRIER

Cover sheathing with air-infiltration barrier as follows:

Apply asphalt-saturated organic felt horizontally with 2-inch (50-mm) overlap and 6 inch (150 mm) end lap; fasten to sheathing with galvanized staples or roofing nails.

Apply air retarder to comply with manufacturer's written instructions.

Apply air-infiltration barrier to cover upstanding flashing with 4-inch (100-mm) overlap.

END OF SECTION 06100

SECTION 07211 – SPRAY POLYURETHANE FORM

PART 1 - GENERAL

This guide discusses the application of seamless sprayed in place closed-cell polyurethane foam for use as a building envelope insulation system. Consult local code agencies for compliance with the governing building code. Consult with approved product manufacturers for suitability of specified materials and job specific installation requirements.

1.01 SCOPE OF WORK

Contractor shall furnish all labor, materials, tools, and equipment necessary for application of the spray polyurethane foam building envelope insulation system, including accessory items, subject to the general provisions of the contract.

A. Apply a minimum of six (6) inches of LaPolla Foam-Lok 2000 Closed-Cell Insulation Foam, or an approved alternate, to the underside of the roof deck and gable walls within the cathedralized attic space of the Seminole Garden Center.

B. Apply a minimum of two (2) inches of LaPolla Foam-Lok 2000 Closed-Cell Insulation Foam, or an approved alternate, to the underside of the floor deck within the crawl space of the Seminole Garden Center.

C. Apply LaPolla Foam-Lok 9000 Barrier to Ignition Coating, or Aldocoat 757, or an approved alternate, to the exposed surface of all spray polyurethane foam installations.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Rough Carpentry - Section 06100
B. Insulation, Other - Section 07200
C. Thermal Barrier - Section 07220
D. Mechanical - Division 15
E. Electrical - Division 16

1.03 QUALITY ASSURANCE

Contractor Qualifications: The contractor shall provide information concerning projects similar in nature to the one proposed, including location and person to contact. Contractor shall provide written confirmation from LaPolla Industries, Inc., or an approved alternate spray polyurethane foam manufacturer, that they are skilled in the application of the specified insulation system.

1.04 SUBMITTALS

A. Manufacturer’s Technical Data Sheets for all materials specified, or subsequently approved for use, on this project.

B. Shop drawings on sheet metal, accessories, or other fabricated items, if required.

C. Manufacturer's application or installation instructions.

D. Approval and information guides for applicable local or national building codes.

E. Safety Instructions for Storage, Handling, and Use for all materials specified, or subsequently approved for use, on this project, including Materials Safety Data Sheets (MSDS).

F. Field Quality Control Procedures utilized by the Contractor to insure proper installation of the spray polyurethane foam insulation system.

1.05 MATERIALS, DELIVERY, AND STORAGE

A. Deliver materials to the jobsite in the manufacturer's original unopened containers, all clearly labeled with the manufacturer's name, product identification, safety information, and batch numbers where appropriate. Labels of materials covered by a referenced specification shall bear the specification number, type, and class, as applicable.

B. Store chemical containers and ancillary materials in a dry, shaded area and maintain within temperatures limits specified by the manufacturer.

C. Store all materials in compliance with local fire and safety requirements.

1.06 ENVIRONMENTAL CONDITIONS

A. Do not apply the spray polyurethane foam below the temperature and/or above the humidity specified by the manufacturer.

B. Apply thermal barriers, ignition barriers, and vapor retarders, (if required), in accordance with the manufacturer's application instructions.

1.07 SEQUENCE AND SCHEDULING

Insulation Contractor shall consult with the General Contractor to coordinate the specified work with other building trades.

1.08 SAFETY REQUIREMENTS

A. API Bulletin AX-119, "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal."

B. Refer to appropriate Material Safety Data Sheets (MSDS) for additional safety information.

C. Dispose waste materials and containers in compliance with federal, state, and local regulatory agencies.

D. For protection against exposure to higher levels of MDI, (greater than 1ppm), or for entry into confined spaces, workers must wear either a self-contained breathing apparatus, with full face piece, operated in a pressure-demand or other positive-pressure mode, or a combination respirator, including a Type C air-supplied respirator, with full face piece, operated in a pressure-demand or other positive-pressure mode, or an auxiliary self-contained breathing apparatus, operated in a pressure-demand or other positive-pressure mode. See API Bulletin "MDI based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal", Stock Number AX-119.

E. Wear appropriate personal protective clothing, including but not limited to eye protection, (face shield or chemical worker's goggles), gloves, and coveralls. This is essential to prevent skin exposure for all individuals who work with PMDI.

PART 2 - PRODUCTS

2.01 POLYURETHANE FOAM

A. The polyurethane foam shall be LaPolla Foam-Lok 2000 Closed-Cell Interior Insulation Foam, or an approved alternate, that is fabricated by combining an isocyanate (A) component with a polyol (B) component and shall possess the following physical characteristics:

NTERIOR POLYURETHANE FOAM: CLOSED-CELL TYPE

PROPERTIES	ASTM TEST	US UNITS
Density (sprayed-in-place)	D-1622	>2.0 lbs/ft^3
R-Value per inch	C-518	> 6.0
Closed Cell Content	D-6226	> 90%
Flame Spread	E-84	10
Smoke Development*	E-84	450

* This standard is used solely to measure and describe properties of products in response to heat and flame under controlled laboratory conditions. This numerical flame spread rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

B. Polyurethane Foam Primers: Use primers recommended by the spray polyurethane foam insulation manufacturer.

C. Fire Safety Requirements: See API Bulletin AX-119. “MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal”

2.02 BARRIER TO IGNITION COATING

A. Apply LaPolla Foam-Lok 9000 Barrier to Ignition Coating, or an approved alternate, to all polyurethane foam installations.

1. Barrier to Ignition coating must comply with applicable requirements of SWRI 99-02.
2. Barrier to Ignition coating and ccSPF shall be from the same manufacturer.

2.03 RELATED PRODUCTS

A. LaPolla Industries, Inc., or an approved alternate spray polyurethane foam manufacturer, shall approve any single-component polyurethane foam sealants used around windows, doors, etc., shall be approved by

B. Substrate Primers (if required)
1. Wood: LaPolla Therm-O-Prime, or an approved alternate
2. Galvanized: LaPolla RCS-30, or an approved alternate
3. Concrete / Masonry: LaPolla Therm-O-Prime, or an approved alternate
4. Other: Consult with the spray polyurethane foam insulation manufacturer

PART 3 - EXECUTION

3.01 APPLICATION OF PRODUCTS

Apply all products used in the building envelope insulation system within the manufacturer's guidelines for temperature, humidity, and other atmospheric conditions. Furthermore, sequence application of all products with consideration of substrate preparation, proper cure times, and inter-coat adhesion.

At all times during material application, Contractor shall mask or otherwise protect adjacent and surrounding substrates from overspray and other potential damage.

3.02 SUBSTRATE CONSIDERATION AND PREPARATION

Surface preparation for substrates receiving insulation and statements regarding the selection of materials related to the successful performance of the spray polyurethane foam insulation are outlined below.

A. WOOD

1. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D-4449 and ASTM 4444-84.
2. Most untreated and unpainted wood surfaces need not be primed. The spray polyurethane foam can be applied directly to the dry wood. Priming may be required in certain instances. Consult with the spray polyurethane foam manufacturer for their recommendation and/or requirements.

B. STEEL

1. Primed: If the primed metal surface is free of loose scale, rust, weathered or chalking paint, it can be cleaned using vacuum equipment and hand or power tools to remove loose dirt. Remove grease, oil, or other contaminants with proper cleaning solutions.
2. Previously Painted: Clean painted metal surface using hand or power tools to remove loose scale and dirt. Grease, oil, and other surface contaminants can be cleaned using a power wash technique.
3. Galvanized: When required, clean galvanized steel as recommended by the primer manufacturer.
4. Unpainted Steel: Clean as recommended by primer manufacturer in order to prepare the steel surface for the primer.

C. CONCRETE AND MASONRY.

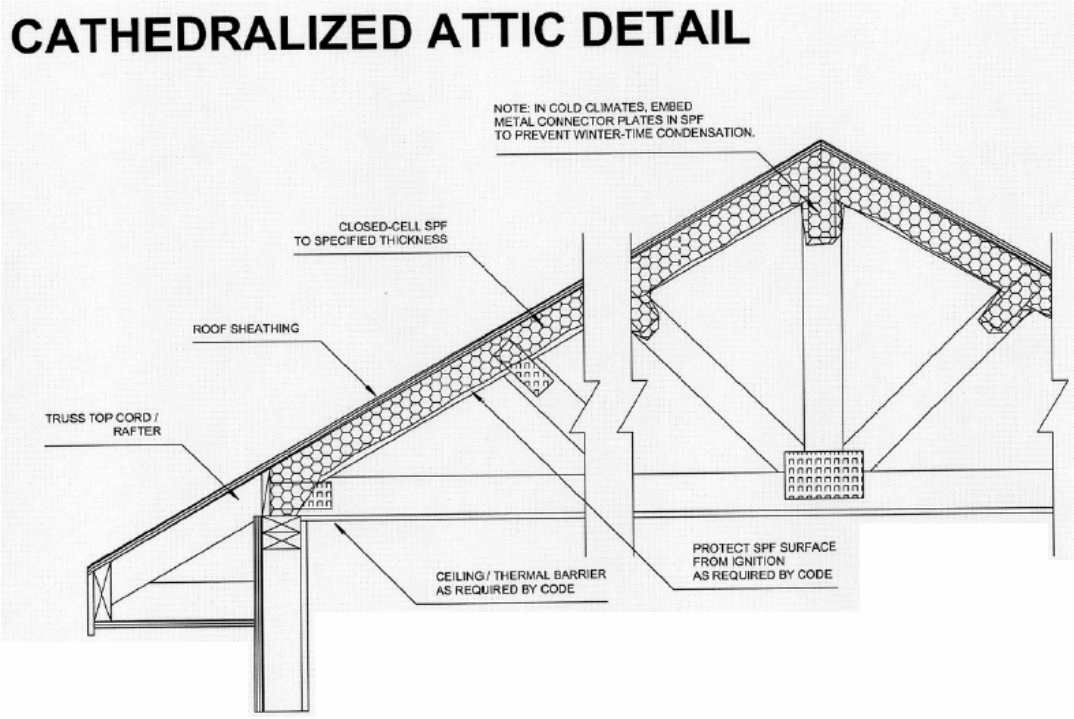
Must be cured, and loose dirt and any other contaminants removed.

D. SHEATHING BOARD.

Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

3.03 PRIMER APPLICATION

When required, the primer shall be applied to the properly prepared substrate in accordance with the manufacturer's guidelines to achieve a minimum thickness of dry mils. Many primers require a curing time of 24 hours prior to application of spray polyurethane foam or other products.


CATHEDRALIZED ATTIC DETAIL
NOTE: IN COLD CLIMATES, EMBED METAL CONNECTOR PLATES IN SPF TO PREVENT WINTER-TIME CONDENSATION.
CLOSED-CELL SPF TO SPECIFIED THICKNESS
ROOF SHEATHING
TRUSS TOP CORD / RAFTER
CEILING / THERMAL BARRIER AS REQUIRED BY CODE
PROTECT SPF SURFACE FROM IGNITION AS REQUIRED BY CODE

SECTION 07411 - MANUFACTURED ROOF PANELS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Standing-seam roof panels.

Related Sections include the following:

Division 5 Section "Structural Steel" for structural-steel framing.

Division 5 Section "Cold-Formed Metal Framing" for metal framing.

Division 7 Section "Sheet Metal Flashing and Trim" for flashing not part of roofing and other sheet metal work.

Division 7 Section "Joint Sealants" for field-applied sealants.

PERFORMANCE REQUIREMENTS

General: Provide manufactured roof panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

Air Infiltration: Provide manufactured roof panel assemblies with permanent resistance to air leakage through assembly of not more than 0.09 cfm/sq. ft. (0.45 L/s/sq. m) of fixed roof area when tested according to ASTM E 1680 at a static-air-pressure difference of 4.0 lbf/sq. ft. (192 Pa).

Water Penetration: Provide manufactured roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E 1646 at a minimum differential pressure of 20 percent of inward acting, wind-load design pressure of not less than 6.24 lb/sq. ft. (300 Pa) and not more than 12.0 lb/sq. ft. (575 Pa).

Structural Performance: Provide manufactured roof panel assemblies capable of safely supporting design loads indicated under in-service conditions with vertical deflection no greater than the following, based on testing manufacturer's standard units according to ASTM E 1592 by a qualified independent testing and inspecting agency.

Maximum Deflection: 1/140 of the span.

Solar Reflectance: Provide manufactured roof panel assemblies with a Solar Reflectance Index

(SRI) value of 29 or higher for steep slope (above 2:12) roofing and an SRI value of 78 or higher for low slope (2:12 of less) roofing.

SUBMITTALS

Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

Shop Drawings: Show layouts of panels on roofs, details of edge conditions, joints, panel profiles, supports, anchorages, trim, flashings, underlayment, closures, snow guards, and special details. Distinguish between factory- and field-assembled work.

For installed products indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Samples for Initial Selection: Manufacturer's color charts or chips showing the full range of colors, textures, and patterns available for roof panels with factory-applied finishes.

Samples for Verification: Provide sample panels 12 inches (300 mm) long by actual panel width, in the profile, style, color, and texture indicated. Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.

Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

Product Test Reports: Indicate compliance of manufactured roof panel assemblies and materials with performance and other requirements based on comprehensive testing of current products.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer who has completed metal roof panel projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated.

Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated without delaying the Work, as documented according to ASTM E 699.

Fire-Test-Response Characteristics: Where fire-resistance-rated roof panel assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

Wind-Uplift Resistance: Provide roof panel assemblies that meet requirements of UL 580 for Class 90 wind-uplift resistance.

Fire-Resistance Ratings: As indicated by design designations in UL's "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

DELIVERY, STORAGE, AND HANDLING

Deliver panels and other components so they will not be damaged or deformed. Package panels for protection against damage during transportation or handling.

Handling: Exercise care in unloading, storing, and erecting roof panels to prevent bending, warping, twisting, and surface damage.

Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

PROJECT CONDITIONS

Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish opening dimensions and proceed with fabricating roof panels without field measurements or allow for trimming panel units. Coordinate roof construction to ensure actual locations of structural members and to ensure opening dimensions correspond to established dimensions.

WARRANTY

General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal roof panels within the specified warranty period and agreeing to
repair finish or replace roof panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

Finish Warranty Period: 20 years from date of Substantial Completion.

Special Weathertight Warranty: Submit a written warranty executed by manufacturer agreeing to repair or replace metal roof panel assembly that fails to remain weathertight within the specified warranty period.

Weathertight Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal panels that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide panels by one of the following:

AEP-Span.
AEICOR.
MBCI

METALS AND FINISHES

Panel: 24 gauge galvalume, sheet made up of 55% aluminum, 1.6% silicon and the balance zinc, as described in ASTM A 792.

Finish: Apply the following organic coating in thickness indicated. Furnish appropriate air-drying spray finish in matching color for touchup.

Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight with a total minimum dry film thickness of 0.9 mil (0.023 mm) and 30 percent reflective gloss when tested according to ASTM D 523.

Durability: Provide coating field tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D 4214; and without fading in excess of 5 Hunter units.

Color: As selected by Architect from manufacturer's full range of colors.

ROOF PANEL ASSEMBLIES

Standing-Seam Roof Panels: Manufacturer's standard factory-formed, standing-seam roof panel assembly designed for concealed mechanical attachment of panels to roof purlins or deck.

Height: 1-1/2”
Width: 24”
Clips: Provide minimum 0.0625-inch- (1.6-mm-) thick, stainless-steel panel clips designed to meet negative-load requirements.

UNDERLAYMENT MATERIALS

Self-Adhering Roof Underlayment: 60 mils polystik by ADESO or equal for metal roof application.

MISCELLANEOUS MATERIALS

General: Provide materials and accessories required for a complete roof panel assembly and as recommended by panel manufacturer, unless otherwise indicated.

Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.

Use aluminum or stainless-steel fasteners for exterior applications and aluminum or galvanized steel fasteners for interior applications.

Provide exposed fasteners with heads matching color of panel by means of plastic caps or factory-applied coating.

Provide metal-backed neoprene washers under heads of exposed fasteners bearing on weather side of panels.

Locate and space exposed fasteners in true vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.

Accessories: Unless otherwise specified, provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross-linked, polyolefin-foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.

Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to seal joints in panel roofing and remain weathertight. Provide sealant recommended by panel manufacturer.

Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat, unless otherwise indicated. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities as recommended by manufacturer.

Expansion-Joint Sealant: For hooked-type expansion joints that must be free to move, provide nonsetting, nonhardening, nonmigrating, heavy-bodied polyisobutylene sealant as recommended by manufacturer.

FABRICATION

General: Fabricate and finish panels and accessories at the factory to greatest extent possible,

by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of metal panel roofing.

Panel Supports and Anchorage: Examine roof framing to verify that purlins, angles, channels, and other secondary structural panel support members and anchorage have been installed according to written instructions of panel manufacturer.

Do not proceed with roof panel installation until unsatisfactory conditions have been corrected.

PREPARATION

Coordinate metal panel roofing with rain drainage work; flashing; trim; and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

PANEL INSTALLATION

General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

Field cutting exterior panels by torch is not permitted.

Install panels with concealed fasteners, unless otherwise indicated.

Install panels with exposed exterior and interior fasteners, prefinished to match panel finishes.

Install panels over solid substrate with minimum 3:12 (1:4) slope. Install 1 ply of felt from lower edge up, with at least 3-inch (75-mm) side laps and 4-inch (100-mm) end laps.

Accessories: Install components required for a complete roof panel assembly including trim, copings, fasciae, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items.

Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized-asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

Install felt underlayment self adhering roof underlayment and building-paper slip sheet on roof deck under metal panels, unless otherwise recommended by panel manufacturer. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under metal panels. Apply from eave to ridge in shingle fashion and lap joints a minimum of 2 inches (50 mm).

Coat back side of metal panels with bituminous coating where it will contact wood, ferrous metal, or cementitious construction.

Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not otherwise indicated, types recommended by panel manufacturer.

Standing-Seam Roof Panel Assembly: Fasten panels to supports with concealed clip according to panel manufacturer's written instructions.

Install clips at each support with self-drilling/self-tapping fasteners.

At end laps of panels, install tape calk between panels.

Install factory-calked cleats at standing-seam joints. Apply snap-on batten to panels to provide a weathertight joint.

Seaming: Complete seaming of panel joints by operating portable power-driven equipment of type recommended by panel manufacturer to provide a weathertight joint.

Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

CLEANING AND PROTECTING

Damaged Units: Replace panels and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

END OF SECTION 07411

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes sealants for the following applications, including those specified by reference to this Section:

Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:

Joints between different materials listed above.

Perimeter joints between materials listed above and frames of doors and windows.

Other joints as indicated.

Exterior joints in the following horizontal traffic surfaces:

Joints between different materials listed above.

Other joints as indicated.

Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

Control and expansion joints on exposed interior surfaces of exterior walls.

Perimeter joints of exterior openings where indicated.

Tile control and expansion joints.

Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.

Joints between plumbing fixtures and adjoining walls, floors, and counters.

Other joints as indicated.

Related Sections include the following:

Division 8 Section "Glazing" for glazing sealants.

Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.

Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

PERFORMANCE REQUIREMENTS

Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

SUBMITTALS

Product Data: For each joint-sealant product indicated.

Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

Field Test Report Log: For each elastomeric sealant application. Include information specified in "Field Quality Control" Article.

Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:

Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

Warranties: Special warranties specified in this Section.

QUALITY ASSURANCE

Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

Testing will not be required if joint sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.

Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

DELIVERY, STORAGE, AND HANDLING

Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PROJECT CONDITIONS

Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.

When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F (4.4 deg C).

When joint substrates are wet.

Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

WARRANTY

General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

Warranty Period: Two years from date of Substantial Completion.

Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.

Disintegration of joint substrates from natural causes exceeding design specifications.

Mechanical damage caused by individuals, tools, or other outside agents.

Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

PRODUCTS AND MANUFACTURERS

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 3.

MATERIALS, GENERAL

Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

ELASTOMERIC JOINT SEALANTS

Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

SOLVENT-RELEASE JOINT SEALANTS

Acrylic-Based Solvent-Release Joint-Sealant Standard: Comply with ASTM C 1311 for each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part 3.

Butyl-Rubber-Based Solvent-Release Joint-Sealant Standard: Comply with ASTM C 1085 for each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part 3.

Pigmented Narrow Joint Sealant: For each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part 3 provide manufacturer's standard, solvent-release-curing, pigmented, synthetic-rubber sealant complying with AAMA 803.3 and formulated for sealing joints 3/16 inch (5 mm) or smaller in width.

LATEX JOINT SEALANTS

Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of Part 3.

ACOUSTICAL JOINT SEALANTS

Acoustical Sealant for Exposed and Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule at the end of Part 3, provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

PREFORMED JOINT SEALANTS

Preformed Silicone-Sealant System: For each product of this description indicated in the Preformed Joint-Sealant Schedule at the end of Part 3, provide manufacturer's standard system consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

Preformed Foam Sealants: For each product of this description indicated in the Preformed Joint-Sealant Schedule at the end of Part 3, provide manufacturer's standard preformed, precompressed, impregnated, open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; factory produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following:

Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.

Impregnating Agent: Neoprene rubber suspended in water-based emulsion.

Density: Manufacturer's standard.

Backing: Pressure-sensitive adhesive, factory applied to one side with protective wrapping.

JOINT-SEALANT BACKING

General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

Type C: Closed-cell material with a surface skin.

Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control

sealant depth, and otherwise contribute to optimum sealant performance.

Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

MISCELLANEOUS MATERIALS

Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

EXAMINATION

Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:

Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

Remove laitance and form-release agents from concrete.

Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

Metal.

Glass.

Porcelain enamel.

Glazed surfaces of ceramic tile.

Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

INSTALLATION OF JOINT SEALANTS

General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

Do not leave gaps between ends of sealant backings.

Do not stretch, twist, puncture, or tear sealant backings.

Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

Install sealants by proven techniques to comply with the following and at the same time backings are installed:

Place sealants so they directly contact and fully wet joint substrates.

Completely fill recesses provided for each joint configuration.

Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

Remove excess sealants from surfaces adjacent to joint.

Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

Use masking tape to protect adjacent surfaces of recessed tooled joints.

Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

Apply masking tape to each side of joint, outside of area to be covered by sealant system.

Apply a bead of silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's printed schedule and covering a bonded area of not less than a 3/8 inch (10 mm). Hold edge of sealant bead inside of masking tape by 1/4 inch (6 mm).

Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.

Complete installation of horizontal joints before installing vertical joints. Lap vertical joints over horizontal joints. At end of joints, cut silicone extrusion with a razor knife.

Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, to produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant to comply with sealant manufacturer's written instructions.

FIELD QUALITY CONTROL

Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates as follows:

Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.

CLEANING

Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

PROTECTION

Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

ELASTOMERIC JOINT-SEALANT SCHEDULE

A. Bituminous based (Type B): Single component, asphalt compound, elongation capability of 2% of joint width.

1. Use for roof sealant and dissimilar material separation at roof.

2. Approved Manufacturers:
    a) Barrier International "BR-30".
    b) Kamak "AR Elastomeric.

B. Acrylic Emulsion Latex (Type C): ASTM C834, single component; color as selected.

1. Formulated to be non-sag printable.
2. Approved Manufacturers:
    a) Bostik "Chem-Calk 600."
    b) Pencora "AC-20."
    c) Sonneborn "Sonolac."
    d) Tremco "Tremco Acrylic Latex 834."

C. Polyurethane Sealant (Type G): ASTM C920, Grade NS, Class 25, Use for exterior sealant joints except where specified herein for silicone type; single component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, none-sagging type; color as selected.

1. Approved Manufacturers
    a) Bostik "Chem-Calk 900."
    b) Mameco "Vulkem 921."
    c) Pecora Dynatrol 1."
    d) Sika "Sikaflex IA."

D. Silicone Sealant (Type K): ASTM C920, Grade NS, Class 25, Use for exterior sealant joints where both faces are metal, glass or other non-porous material; single component, fungus resistant, acidic curing, non-sagging, non-staining, non-bleeding; color as selected.

1. Approved Manufacturers:
    a) Bostik "Chem-Calk 1200."
    b) Dow "Dow Corning 999A."
    c) General Electric "Construction 1200."
    d) Pecora Corp. "863."
    e) Tremco, Inc. "Proglaze."

END OF SECTION 07920

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes steel doors and frames.

Related Sections: The following Sections contain requirements that relate to this Section:

Division 4 Section "Unit Masonry" for building anchors into and grouting frames in masonry construction.

Division 8 Section "Flush Wood Doors" for hollow-core and solid-core wood doors installed in steel frames.

Division 8 Section "Door Hardware" for door hardware and weatherstripping.

Division 9 Section "Painting" for field painting primed doors and frames.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

Indicate coordination of glazing frames and stops with glass and glazing requirements.

Samples for initial selection in the form of manufacturer's color charts showing the full range of colors available for factory-finished doors and frames.

Samples for verification of each type of exposed finish required, prepared on Samples not less than 3 by 5 inches (75 by 125 mm) and of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

Oversize Construction Certification: For door assemblies required to be fire rated and exceeding limitations of labeled assemblies, submit certification of a testing agency acceptable to authorities having jurisdiction that each door and frame assembly has been constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

QUALITY ASSURANCE

Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.

Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors conform to all standard construction requirements of tested and labeled fire-rated door assemblies except for size.

Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

DELIVERY, STORAGE, AND HANDLING

Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

Store doors and frames at building site under cover. Place units on minimum 4-inch- (100-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Steel Doors and Frames:

Amweld Building Products, Inc.
Ceco Door Products.
Steelcraft.
Metal Products, Inc.

MATERIALS

Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569 (ASTM A 569M).

Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366 (ASTM A 366M), commercial quality, or ASTM A 620 (ASTM A 620M), drawing quality, special killed.

Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A 526 (ASTM A 526M), commercial quality, or ASTM A 642 (ASTM A 642M), drawing quality, hot-dip galvanized according to ASTM A 525, with A 60 or G 60 (ASTM A 525M, with Z 180 or ZF 180) coating designation, mill phosphatized.

Supports and Anchors: Fabricated from not less than 0.0478-inch- (1.2-mm-) thick steel sheet; 0.0516-inch- (1.3-mm-) thick galvanized steel where used with galvanized steel frames.

Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

DOORS

Steel Doors: Provide 1-3/4-inch- (44-mm-) thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:

Exterior Doors: Grade II, heavy-duty, Model 2, seamless design, minimum 0.0516-inch- (1.3-mm-) thick galvanized steel sheet faces.

FRAMES

Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 0.0478-inch- (1.2-mm-) thick cold-rolled steel sheet.

Fabricate frames with mitered or coped corners, continuously welded construction.

Fabricate frames for interior openings over 48 inches (1220 mm) wide from 0.0598-inch- (1.5-mm-) thick steel sheet.

Fabricate exterior frames for openings over 48 inches (1220 mm) wide from 0.0635-inch- (1.6-mm-) thick galvanized steel sheet.

Form exterior frames from 16 gauge thick galvanized steel sheet.

Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.

Plaster Guards: Provide minimum 0.0179-inch- (0.45-mm-) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

Grout: When required in masonry construction, as specified in Division 4 Section "Unit Masonry."

FABRICATION

Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.

Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:

Resin-impregnated paper honeycomb.

Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between non-fire-rated pairs of doors. Not more than 3/4 inch (19 mm) at bottom.

Fire Doors: Provide clearances according to NFPA 80.

Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel sheet.

Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

Galvanized Steel Doors, Panels, and Frames: Fabricate doors, panels, and frames from galvanized steel sheet according to SDI 112. Close top and bottom edges of doors flush as an integral part of door construction or by addition of minimum 0.0635-inch- (1.6-mm-) thick galvanized steel channels, with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.

Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

Unless otherwise indicated, provide thermal-rated assemblies with U-value rating of 0.41 Btu/sq. ft. x h x deg F (2.33 W/sq. m x K) or better.

Sound-Rated (Acoustical) Assemblies: Where shown or scheduled, provide door and frame assemblies fabricated as sound-reducing type, tested according to ASTM E 1408, and classified according to ASTM E 413.

Unless otherwise indicated, provide acoustical assemblies with STC sound ratings of 33 or better.

Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

For concealed overhead door closers, provide space, cutouts, reinforcing, and provisions for fastening in top rail of doors or head of frames, as applicable.

Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

Glazing Stops: Minimum 0.0359-inch- (0.9-mm-) thick steel or 0.040-inch- (1-mm-) thick aluminum.

Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.

Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors.

FINISHES, GENERAL

Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.

Apply primers and organic finishes to doors and frames after fabrication.

GALVANIZED STEEL SHEET FINISHES

Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.

Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

PART 3 - EXECUTION

INSTALLATION

General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.

In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.

In in-place gypsum board partitions, install knock-down, slip-on, drywall frames.

Install fire-rated frames according to NFPA 80.

Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.

Fire-Rated Doors: Install with clearances specified in NFPA 80.

Smoke-Control Doors: Comply with NFPA 105.

ADJUSTING AND CLEANING

Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Solid-core doors with wood-veneer faces.

Factory finishing flush wood doors.

Factory fitting flush wood doors to frames and factory machining for hardware.

Louvers for flush wood doors.

Related Sections include the following:

Division 6 Section "Rough Carpentry" for nailers and blocking.

SUBMITTALS

Product Data: For each type of door. Include details of core and edge construction, trim for openings, and louvers.

Include factory-finishing specifications.

Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

Indicate dimensions and locations of mortises and holes for hardware.

Indicate dimensions and locations of cutouts.

Indicate requirements for veneer matching.

Indicate doors to be factory finished and finish requirements.

Indicate fire ratings for fire doors.

Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:

Faces of factory-finished doors with transparent finish.

Samples for Verification: As follows:

Corner sections of doors approximately 8 by 10 inches (200 by 250 mm) with door faces and edgings representing the typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.

Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.

QUALITY ASSURANCE

Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

Quality Standard: Comply with the following standard:

AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.

ENVIRONMENTAL RESPONSIBILITY: Provide door manufactured with any of the following environmentally responsible core materials:

1. Particleboard Core: Forest Stewardship Council (PSC) certified.
2. Agrifiber Core: Contains rapidly renewable materials and recycled content.
3. Stave Lumber Core: Forest Stewardship Council (FSC) certified.
4. Structural Composite Lumber (SCL): Contains low emitting materials that reduce the quantity of indoor air contaminants.

DELIVERY, STORAGE, AND HANDLING

Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.

Individually package doors in plastic bags or cardboard cartons.

Individually package doors in cardboard cartons and wrap bundles of doors in plastic sheeting.

Comply with WIC's Technical Bulletin 420-R for delivery, storage, and handling of doors.

Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

PROJECT CONDITIONS

Environmental Limitations: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

WARRANTY

General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not comply with tolerances in referenced quality standard.

Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

Warranty shall be in effect during the following period of time after the date of Substantial Completion:

Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Flush Wood Doors:

Algoma Hardwoods Inc.
Eggers Industries; Architectural Door Division.
Weyerhaeuser Co.

DOOR CONSTRUCTION, GENERAL

Doors for Transparent Finish: Comply with the following requirements:

Grade: Custom (Grade A faces).

Faces: White birch, rotary cut.

Match between Veneer Leaves: Book match.

Pair and Set Match: Provide for pairs of doors and for doors hung in adjacent sets.

SOLID-CORE DOORS

Solid (Non-Rated): AWI Section 1300, Type PC-5 - Particleboard.

Interior Veneer-Faced Doors: Comply with the following requirements:

Core: Particleboard core.

Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.

LOUVERS AND LIGHT FRAMES

Wood Louvers: Door manufacturer's standard solid wood louvers, unless otherwise indicated.

FABRICATION

Fabricate flush wood doors in sizes indicated for Project site fitting.

Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.

Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

Light Openings: Trim openings with moldings of material and profile indicated.

Louvers: Factory install louvers in prepared openings.

Flash top of outswinging doors (with manufacturer's standard metal flashing).

PART 3 - EXECUTION

EXAMINATION

Examine installed door frames before hanging doors.

Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.

Reject doors with defects.

Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION

Hardware: For installation, see Division 8 Section "Door Hardware."

Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold.

Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at Project site.

ADJUSTING AND PROTECTING

Operation: Rehang or replace doors that do not swing or operate freely.

Finished Doors: Refinish or replace doors damaged during installation.

Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08211

SECTION 08361 - SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following types of sectional overhead doors:

Doors with aluminum-framed aluminum and full vision panels as shown.

Tracks configured for the following lift types:

Standard.

Related Sections include the following:

Division 8 Section "Door Hardware" for lock cylinders and keying.

Division 16 Section "Conductors and Cables" for electrical service and connections for powered operators, and accessories.

Division 16 Section "Disconnect Switches and Circuit Breakers" for disconnect switches and circuit breakers for powered operators.

DEFINITIONS

Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

PERFORMANCE REQUIREMENTS

Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:

Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward and outward. Coupling w/FBC 130 mph enclosed structure.

Operation-Cycle Requirements: Design sectional overhead door components and operator to operate for not less than 10,000 cycles.

SUBMITTALS

Product Data: For each type and size of sectional overhead door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:

Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.

Summary of forces and loads on walls and jambs.

Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.

Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.

Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.

Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied finishes.

Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

Frame: 6-inch (150-mm) length.

Panel: 6 inches (150 mm) square.

Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

Manufacturers' Certificates: Signed by manufacturers certifying that they comply with requirements specified in "Quality Assurance" Article. On request, submit evidence of manufacturing experience.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer who is an authorized representative of the sectional overhead door manufacturer for both installation and maintenance of units required for this Project.

Manufacturer Qualifications: Engage a firm experienced in manufacturing sectional overhead doors similar to those indicated for this Project and with a record of successful in-service performance.

Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer.

Obtain operators and controls from the sectional overhead door manufacturer.

Product Options: Drawings indicate size, profiles, and dimensional requirements of sectional overhead doors and accessories and are based on the specific system indicated. Other manufacturers' systems with equal performance and dimensional characteristics may be considered. Refer to Division 1 Section "Substitutions."

Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.

The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

PART 2 - PRODUCTS

MANUFACTURERS

Manufacturer: Subject to compliance with requirements, provide products by the following or equal:

Clopay Building Products Co.
902I w/insulated glass. Provide aluminum panels at bottom and top as indicated on drawings.

ALUMINUM SECTIONS

Construct door sections with extruded-aluminum shapes, complying with ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, with wall thickness not less than 0.065 inch (1.6 mm) for door section 2-1/8 inches (44 mm) deep 3-1/2 wide. Fabricate sections with stile and rail dimensions and profiles required and shown. Join stiles and rails by welding or with concealed, 1/4-inch- (6-mm-) minimum-diameter, aluminum or nonmagnetic stainless-steel through bolts, full height of door section. Form meeting rails to provide a weathertight-seal joint. Provide reinforcement for hardware attachment.

Fabricate panels of aluminum sheet, complying with ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, not less than 0.040 inch (1.0 mm) thick, set in continuous vinyl channel retained with rigid, snap-in, extruded-vinyl moldings or with rubber or neoprene glazing gasket with aluminum stop.

General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

Fixtures designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

Finish doors with manufacturer's standard powder-coat-applied paint system.

Color and Gloss: As selected by Architect from manufacturer's full range of colors and glosses.

TRACKS, SUPPORTS, AND ACCESSORIES
Tracks: Provide manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653 (ASTM A 653M), for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track at 2 inches (50 mm) o.c. for door-drop safety device. Slope tracks at proper angle from vertical or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members, complying with ASTM A 36 (ASTM A 36M) and ASTM A 123. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.

Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and at top of overhead door.

Provide motor-operated doors with combination bottom weatherseal and sensor edge.

In addition, provide continuous flexible seals at door jambs for a weathertight installation.

Windows: Provide windows of type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors and elastic glazing compound for wood doors, as required. Provide removable stops of same material as door section frames 1/2" insulated.

Size: Manufacturer's standard panel for type of glazing indicated.

Tinted Tempered Glass: 3-mm clear tempered glass, complying with ASTM C 1036, Type I, Class 1, Quality q3 as selected from manufacturer standard warranty 1/2" insulated.

Panel Sections: 2 inches (52 mm) thick roll formed commercial quality steel panel sections, hot-dip galvanized per ASTM A 924/A, 924M and ASTM A 653/A 653/M, phosphatized and prepainted with primer and baked-on polyester topcoat. Panel faces reinforced with two 1/2 inch (13 mm) deep ribs on 8 inches (200 mm) centers, complemented by six 1/8 inch (3 mm) beads on 2 inches (50 mm) centers. Sections formed to create a weathertight tongue and groove meeting rail. Bottom panel section reinforced with continuous 0.050 inch (1.27 mm) aluminum astragal retainer with U-shaped flexible PVC astragal.

HARDWARE

General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

Hinges: Provide heavy-duty galvanized steel hinges, of not less than 0.0747-inch- (1.9-mm-) thick uncoated steel, at each end stile and at each intermediate stile, per manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges, where required, for doors exceeding 16 feet (4.87 m) in width, unless otherwise recommended by door manufacturer.

Rollers: Provide heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- (75-mm-) diameter roller tires for 3-inch (75-mm) track, 2-inch- (50-mm-) diameter roller tires for 2-inch (50-mm) track, and as follows:
Case-hardened steel tires.

With Manual Pull Chains: For push-up-operated or emergency-operated doors, provide galvanized steel pull chains on each side of door.

Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.

Locking Bars: Single-jamb side, operable from inside only.

Chain Lock Keeper: Suitable for padlock.

Where door unit is power operated, provide safety interlock switch to disengage power supply when door is locked.

COUNTERBALANCING MECHANISM

Torsion Spring: Operation by torsion-spring counterbalance mechanism consisting of adjustable-tension torsion springs, fabricated from oil-tempered-steel wire complying with ASTM A 229 (ASTM A 229M), Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for 10,000 cycles minimum.

Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

ELECTRIC DOOR OPERATORS

General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operational life specified, complete with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

Comply with NFPA 70.

Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.

Door-Operator Type: Provide unit consisting of electric motor and the following:

Jackshaft gear-head type, with enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and quick disconnect-release for manual operation.

Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps (0.2 m/s) and not more than 1 fps (0.3 m/s), without exceeding nameplate ratings or considering service factor.

Type: Polyphase, medium-induction type.

Service Factor: According to NEMA MG 1, unless otherwise indicated.

Coordinate wiring requirements and electrical characteristics of motors with building electrical system.

Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.

Provide totally enclosed, nonventilated or fan-cooled motors, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.

Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."

Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

Provide exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.

Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

Self-Monitoring Type: Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.

Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

Radio Control: Provide radio control system consisting of the following:

3-channel universal coaxial receiver to open, close, and stop door, 1 per operator.

Multifunction remote control.

Remote antenna mounting kit.

PART 3 - EXECUTION

EXAMINATION

Examine wall and overhead areas, including opening framing and blocking, with Installer present, for compliance with requirements for installation tolerances, clearances, and other conditions affecting performance of Work of this Section.

Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION

General: Install door, track, and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

Fasten vertical track assembly to framing at not less than 24 inches (600 mm) o.c. Hang horizontal track from structural overhead framing with angle or channel hangers welded and bolt fastened in place. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

ADJUSTING

Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

DEMONSTRATION

Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

Review data in the maintenance manuals. Refer to Division 1 Section "Contract Closeout."

Review data in the maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."

Schedule training with Owner with at least 7 days' advance notice.

END OF SECTION 08361

SECTION 08410 - ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Exterior storefront systems.

Related sections include the following:

Division 7 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.

Division 8 Section "Glazing."

SYSTEM DESCRIPTION

General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:

Air infiltration and water penetration exceeding specified limits.

Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

Glazing: Physically and thermally isolate glazing from framing members.

Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.

Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch (19 mm), whichever is smaller, unless otherwise indicated.

Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

Test Pressure: 150 percent of inward and outward wind-load design pressures.

Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.

Hurricane-Resistance Test Performance: Provide entrance and storefront systems that pass large and small missile-impact tests, as required by systems' location above grade, and cyclic-pressure tests according to testing requirements of authorities having jurisdiction.

Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.

Provide a minimum 1/8-inch (3.18-mm) clearance between members and top of glazing or other fixed part immediately below.

Provide a minimum 1/16-inch (1.59-mm) clearance between members and operable windows and doors.

Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.

Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. (0.3 L/s/sq. m) of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75.2 Pa).

Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. (299 Pa). Water leakage is defined as follows:

Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.

Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.

Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F (3.57 W/sq. m x K) when tested according to AAMA 1503.1.

Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

SUBMITTALS

Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch (150-mm) lengths of full-size components and showing details of the following:

Joinery.

Anchorage.

Expansion provisions.

Glazing.

Flashing and drainage.

Structural-sealant joints.

Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

Field Test Reports: Indicate and interpret test results for compliance with storefront systems' performance requirements.

Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.

Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria

conforming to ASTM E 699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.

Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

PROJECT CONDITIONS

Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

WARRANTY

General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

Structural failures including, but not limited to, excessive deflection.

Adhesive sealant failures.

Cohesive sealant failures.

Failure of system to meet performance requirements.

Deterioration of metals, metal finishes, and other materials beyond normal weathering.

Failure of operating components to function normally.

Water leakage through fixed glazing and frame areas.

Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be

incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

EFCO Corporation Series 526 with 1 5/16" insulated impact glazing.

MATERIALS

Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

Sheet and Plate: ASTM B 209 (ASTM B 209M).

Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).

Extruded Structural Pipe and Tubes: ASTM B 429.

Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).

Welding Rods and Bare Electrodes: AWS A5.10.
Steel Reinforcement: Complying with ASTM A 36 (ASTM A 36M) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 (ASTM A 570M) for hot-rolled sheet and strip.

Glazing as specified in Division 8 Section "Glazing."

Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."

Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

COMPONENTS

Provide manufacturer's standard 5 inch thick frames (44.5-mm-) similar to NuCore 1/4" system with minimum 0.125-inch- (3.2-mm-) thick, extruded tubular members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.

Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.

Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

Reinforce members as required to retain fastener threads.

Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.

Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, complying with ASTM A 666, of type selected by manufacturer for compatibility with system.

FABRICATION

General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

Fabricate components for screw-spline frame construction.

Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

Prepare components to receive concealed fasteners and anchor and connection devices.

Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

ALUMINUM FINISHES

General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.

Color: As selected by Architect from the full range of industry colors and color densities.

PART 3 - EXECUTION

EXAMINATION

Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION

General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."

Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

Install structural silicone sealant according to sealant manufacturer's written instructions.

Mechanically fasten glazing in place until structural sealant is cured.

Remove excess sealant from component surfaces before sealant has cured.

Install secondary-sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:

Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.

Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

FIELD QUALITY CONTROL

Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing indicated.

Structural-Silicone-Sealant Adhesion Test: Test installed structural silicone sealant according to field adhesion test method described in AAMA CW #13, "Structural Sealant Glazing Systems (A Design Guide)."

Test a minimum of 2 areas.

Water Spray Test: After completing the installation of test areas indicated, test storefront system for water penetration according to AAMA 501.2 requirements.

Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

ADJUSTING AND CLEANING

Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.

Remove excess sealant and glazing compounds, and dirt from surfaces.

PROTECTION

Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08410

SECTION 08520 - ALUMINUM WINDOWS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes Commercial Grade aluminum windows of the performance class indicated. Window types required include the following:

Single-hung windows.

DEFINITIONS

Dual windows are double-hung, single hung, horizontal-sliding, and fixed-type units with both a prime and a secondary window combined in a single composite unit. The prime window element protects the building from climatic elements. The secondary window is used for energy conservation and acoustical control.

Performance class number, included as part of the window designation system, is the actual design pressure in pounds force per square foot (pascals) used to determine structural test pressure and water test pressure.

Structural test pressure, wind load test, is equivalent to 150 percent of the design pressure.

Water-leakage-resistance test pressure is equivalent to 15 percent of the design pressure with 8.25 lb/sq. ft. as a minimum for Heavy-Commercial Grade windows.

PERFORMANCE REQUIREMENTS

General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.

Structural Performance: No failure or permanent deflection in excess of 0.4 percent of any member's span after removing the imposed load, for a positive (inward) and negative (outward) test pressure of 82.50 lb/sq. ft. (1437 Pa) (ASTM E 330).

Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F 588.

Thermal Movements: Provide window units that allow thermal movement resulting from the following maximum change (range) in ambient temperature when engineering, fabricating, and installing aluminum windows to prevent buckling, opening of joints, and overstressing of components, connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime sky heat loss.

Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification

Sections.

Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:

Layout and installation details, including anchors.

Elevations at 1/4 inch = 1 foot (1:50) scale and typical window unit elevations at 3/4 inch = 1 foot (1:20) scale.

Samples for initial color selection on 12-inch- (300-mm-) long sections of window members. Where finishes involve normal color variations, include Sample sets showing the full range of variations expected.

Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated based on comprehensive testing of current window units within the last 5 years. Test results based on use of down-sized test units will not be accepted.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of 3 successful years in-service performance.

Product Options: The Drawings indicate locations of 13 aluminum windows and are based on the specific window types and models indicated. Other aluminum window manufacturers whose products have equal performance characteristics may be considered provided deviations in size, profile, and dimensions are minor and do not alter the aesthetic effect. Refer to Division 1 Section "Substitutions."

PROJECT CONDITIONS

Field Measurements: Check window openings by field measurements before shop drawing submittals, fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Where field measurements cannot be made without delaying the Work, guarantee opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to guaranteed dimensions.

WARRANTY

General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Special Warranty: Submit a written warranty signed by aluminum window manufacturer agreeing to repair or replace window components that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

Structural failures including excessive deflection, water leakage, air infiltration, or condensation.

Faulty operation of sash and hardware.

Deterioration of metals, metal finishes, and other materials beyond normal weathering.

Warranty Period: 3 years after date of Substantial Completion.

Warranty Period for Metal Finishes and Glass: 5 years after date of Substantial Completion. Manufacturer shall warrant finish against fading, chipping or caulking.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Window Unit is specified on the basis of EFCO Non-Thermal C-HCIOO grade casement windows.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Projected Windows:

EFCO Corporation 2700 Series or Equivalent

MATERIALS

Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength and not less than 0.062 inch (1.6 mm) thick at any location for main frame and sash members.

Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.

Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch (3.2 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, splined grommet nuts.

Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.

Compression-Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

Provide stripping with integral centerline barrier fin of semirigid plastic sheet of polypropylene.

Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

HARDWARE

General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.

Limit Device: Provide manufacturer's standard, concealed support arms with adjustable, limited, hold-open limit device designed to restrict ventilator opening.

Counterbalancing Mechanism: Comply with AAMA 902.2.

Sash-Balance Type: Concealed block-and-tackle type of size and capacity to hold sash stationary at any open position.

ACCESSORIES

General: Provide manufacturer's standard accessories that comply with indicated standards.

Reinforce window units or mullions to receive bolts and provide additional anchorage of units at bolt locations.

Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on inside of window sash or ventilator, depending on window type. Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches.

Screen Frames: Fabricate frames of tubular-shaped, extruded- or formed-aluminum members of 0.040-inch minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Finish frames to match window units.

Weatherstripping: Provide sliding-type weatherstripping where sash rails slide horizontally or vertically along unit frame. Provide compression-type weatherstripping at perimeter of each operating sash where sliding type is inappropriate.

Provide weatherstripping locked into extruded grooves in sash.

FABRICATION

General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.

Provide units that are reglazable without dismantling sash or ventilator framing.

Prepare window sash or ventilators for glazing, except where preglazing at the factory is indicated.

Subframes: Provide subframes with anchors for window units as required, of profile and dimensions as recommended by manufacturer but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units.

Mullions: Provide mullions and cover plates as required, matching window units, complete with anchors for support to structure and installation of window units. Mullions adjoining windows to met 5S psf. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated.

Preglazed Fabrication: Preglaze window units at the factory by manufacturer for applications indicated. Glass is to be 9/16” tinted, heat-treated laminated safety glass ASTM C 1048, condition A.

FINISHES

Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

Frame Finish to be Valspar Acroflur Hardcoast AAMA 605.2-97, 1.2" mil minimum thickness.

Color: Anodic clear mill finish.

PART 3 - EXECUTION

INSPECTION

Inspect openings before installation. Verify that rough or masonry opening is correct and sill plate is level.

Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.

INSTALLATION

Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.

Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.

> Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.

Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Coordinate installation with wall flashings and other components of the Work.

FIELD QUALITY CONTROL

At the option of the Architect, windows shall be field tested in accordance with AAMA 502.90.

ADJUSTING

Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and a weathertight closure.

CLEANING

Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

Clean glass of preglazed units promptly after installing windows. Comply with requirements of Division 8 Section "Glazing" for cleaning and maintenance.

PROTECTION

Provide final protection and maintain conditions, in a manner acceptable to aluminum window manufacturer, that ensure window units are without damage or deterioration at the time of Substantial Completion.
END OF SECTION 08520

FINISH HARDWARE
Section 08710

PART I - GENERAL

1.01 WORK INCLUDED

A. The work in this section shall include furnishing of all items of finish hardware as hereinafter specified or obviously necessary to complete the building, except those items that are specifically excluded from this section of the specification.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Hollow Metal Doors and Frames
B. Aluminum Doors and Frames
C. Wood Doors and Frames

1.03 DESCRIPTION OF WORK

A. Furnish labor and material to complete hardware work indicated, as specified herein, or as may be required by actual conditions at building.
B. Include all necessary screws, bolts, expansion shields, other devices, if necessary, as required for proper hardware application. The hardware supplier shall assume all responsibility for correct quantities.
C. Hardware shall meet the requirements of Federal, State and Local codes having jurisdiction over this project, notwithstanding any real or apparent conflict therewith in these specifications.
D. Fire-rated openings:
    1. Provide hardware for fire-rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80, NFPA Standards NO. 101, UBC 702 (1997) and UL10C. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required, and complies with the requirements of the door and door frame labels.
    2. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating Fire Door to be equipped with fire exit hardware and provide UL label on exit device indicating “Fire Exit Hardware”.
E. Fasteners:
    1. Hardware as furnished shall conform to published templates generally prepared for machine screw installation.
    2. Furnish each item complete with all screws required for installation. Typically, all exposed screws installation.
    3. Insofar as practical, furnished concealed type fasteners for hardware units that have exposed screws shall be furnished with Phillips flat head screws, finished to match adjacent hardware.
    4. Door closers and exit devices to be installed with closed head through bolts (sex bolts).
F. Exterior openings
    1. Provide hardware for hurricane openings in compliance with local jurisdiction. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by local authority for the types and sizes of doors required, and complies with the requirements of the door and door frame. Coordinate Section (08710) Finish Hardware with the Hollow Metal Doors and Frames (08110) and Aluminum Doors and Frames (08210).

1.04 QUALITY ASSURANCE

A. The supplier to be a directly franchised distributor of the products to be furnished and have in their employ an AHC (Architectural Hardware Consultant). This person is to be available for consultation to the architect, owner and the general contractor at reasonable times during the course of work.
B. The finish hardware supplier shall prepare and submit to the architect six (6) copies of a complete schedule identifying each door and each set number, following the numbering system and not creating any separate system himself. He shall submit the schedule for review, make corrections as directed and resubmit the corrected schedule for final approval. Approval of schedule will not relieve Contractor of the responsibility for furnishing all necessary hardware, including the responsibility for furnishing correct quantities.
C. No manufacturing orders shall be placed until detailed schedule has been submitted to the architect and written approval received.
D. After hardware schedule has been approved, furnish templates required by manufacturing contractors for making proper provisions in their work for accurate fitting, finishing hardware setting. Furnish templates in ample time to facilitate progress of work.
E. Hardware supplier shall have an office and warehouse facilities to accommodate the materials used on this project. The supplier must be an authorized distributor of the products specified.
F. The hardware manufactures are to supply both a pre-installation class as well as a post-installation walk-thru. This is to insure proper installation and provide for any adjustments or replacements of hardware as required.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Wrap, protect finishing hardware items for shipment. Deliver to manufacturing contractors hardware items required by them for their application; deliver balance of hardware to job; store in designated location. Each item shall be clearly marked with its intended location.

1.06 WARRANTY

A. The material furnished shall be warranted for one year after installation or longer as the individual manufacturer’s warranty permits.
B. The manufacturer against failure due to defective materials and workmanship shall warrant overhead door closers in writing for a period of ten (10) years. Commencing on the Date of Final Completion and Acceptance, and in the event of failure, the manufacture is to promptly repair or replace the defective with no additional cost to the Owner.

PART II - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. To the greatest extent possible, obtain each kind of hardware from only one manufacturer.
B. All numbers and symbols used herein have been taken from the current catalogues of the following manufacturers.

PRODUCT	ACCEPTABLE MANUFACTURER	ACCEPTABLE SUBSTITUTE
1) Hinges	Ives	Hager, Stanley, Bommer
2) Locks & Latches	Schlage Locks	None (Owners Standard)
3) Exit Devices	Von Duprin	None (Owners Standard)
4) Door Closers	LCN	None (Owners Standard)
5) Wall Stops/Floor Stops, Flushbolts	Ives	Rockwood, Hager
6) Kick Plates	Ives	Rockwood, Hager
7) Threshold/Weather-strip	National Guard	Pemko, Zero
8) Silencers	Ives	Rockwood, Hager
9) Key Cabinet	Lund	Key Control

C. If material manufactured by other than that specified or listed herewith as an equal, is to be bid upon, permission must be requested from the architect seven (7) days prior to bidding. If substitution is allowed, it will be so noted by addendum.

2.02 FINISH OF HARDWARE:

A. Exterior Hinges to be Stainless Steel (32D), Interior Hinges to be Satin Chrome (26D). Door Closers to be Aluminum. Locks to be Satin Chrome (26D), Exit Devices to be Satin Chrome (26D). Overhead Holders to be Satin Chrome (26D), Flat Goods to be Satin Chrome (26D) or Stainless Steel (32D) and the Thresholds to be Mill Finish Aluminum.

2.03 HINGES AND PIVOTS:

A. Exterior butts shall be Stainless Steel. Butts on all out swinging doors shall be furnished with non-removable pins (NRP).
B. Interior butts shall be as listed.
C. Doors 5’ or less in height shall have two (2) butts. Furnish one (1) additional butt for each 2’6” in height or fraction thereof. Dutch door shall have two (2) butts per leaf.

2.04 KEYING:

A. Equip locks and cylinders with Schlage Everest cylinders.
B. All bittings shall be issued by lock manufacture per owners instructions.
C. Provide Two (2) each change keys per lock and Six (6) each grand master, master keys, two (2) construction and two (2) permanent control keys.
D. Hardware supplier to provide temporary cylinders or cores during the construction phase. The contractor is to change out the temporary cylinders for the permanent cylinders.
E. Provide six master keys to all doors except food closets, medicine closet, chief and captain rooms. Those rooms to be keyed independently.

2.05 LOCKSETS:

A. Locksets shall be Heavy Duty type, unless specified otherwise, in “L” and “ND” Series, Lever designs as manufactured by Schlage Lock Company.

1. Acceptable substitutions:
   A. None (Owners Standard)

2.06 EXIT DEVICES:

A. Exit devices shall be Von Duprin 98 Series in types and functions specified. All devices must be listed under “Panic Hardware” in accident equipment list of Underwriters Laboratories. All labeled doors with “Fire Exit Hardware” must have labels attached and be in strict accordance with Underwriters Laboratories.
B. Exit devices shall be tested to ANSI/BHMA A156.3 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 1,000,000 cycles must be provided.
C. Surface strikes shall be roller type and come complete with a plate underneath to prevent movement. And shall be provided with a dead-latching feature to prevent latch bolt tampering.

1. Acceptable substitutions:
   A. None (Owners Standard)

2.07 DOOR CLOSERS:

A. Closers shall be LCN 4000 Series having non-ferrous covers, forged steel arms separate valves for adjusting backcheck, closing and latching cycles and adjustable spring to provide up to 50% increase in spring power. Closers shall be furnished with parallel arm mounted on all doors opening into corridors or other public spaces and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Furnish with non-hold open arms unless otherwise indicated.

B. Door closer cylinders shall be of high strength cast iron construction to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.

C. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards UBC 7-2 (1997) and UL 10C.

D. Door closers shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging from particles within the closer. Closers shall have separate and independent screw valve adjustments for latch speed, general speed, and hydraulic backcheck. Backcheck shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location to protect the door frame and hardware from damage. Pressure relief valves (PRV) are not acceptable.

1. Acceptable substitutions:
   A. None (Owners Standard)

2.08 TRIM AND PLATES:

A. Kick plates, mop plates, and armor plates, shall be .050 gauge with 32D finish. Kick plates to be 10" high, mop plates to be 4" high. All plates shall be two (2) inches less full width of door.
B. Push plates, pull plates, door pulls, and miscellaneous door trim shall be shown in the hardware schedule.

2.09 DOOR STOPS:

A. Doorstops shall be furnished for all doors to prevent damage to doors or hardware from striking adjacent walls or fixtures. Wall bumpers equal to Ives WS407 Series are preferred, but where not practical furnish floor stops equal to Ives FS436 or FS438 series. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops equal to Glynn Johnson, 450 Series.

2.10 THRESHOLDS AND WEATHERSTRIP:

A. Thresholds and weather-strip shall be as listed in the hardware schedule.

2.11 DOOR SILENCERS:

A. Furnish rubber door silencers equal to Ives SR64 for all new interior hollow metal frames, (2) per pair and (3) per single door frame.

PART III - EXECUTION

3.01 INSTALLATION:

A. All hardware shall be applied and installed in accordance with the Finish Hardware schedule. Care shall be exercised not to mar or damage adjacent work.
B. Contractor to provide a secure lock-up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items that are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses both before and after installation.
C. No hardware is to be installed until the hardware manufactures have provided a pre-installation class to insure proper installation of the specified products. A post installation inspection by a manufacturer's representative will be provided to insure proper installation.

3.02 ADJUSTING AND CLEANING:

A. Contractor shall adjust all hardware in strict compliance with manufacturer's instructions. Prior to turning project to owner, contractor shall clean and make any final adjustments to the finish hardware.

3.03 PROTECTION:

A. Contractor shall protect the hardware, as it is stored on construction site in a covered and dry place.
B. Contractor shall protect exposed hardware installed on doors during the construction phase.

3.04 KEY CABINET:

A. Set up and index one (1) Key Cabinet that allows room for expansion for 150% of the number of keys for the project.

3.05 HARDWARE SCHEDULE:

A. The following schedule is furnished for whatever assistance it may afford the contractor; do not consider it as entirely inclusive. Should any particular door or item be omitted in any scheduled hardware group, provide door or item with hardware same as required for similar purposes. Quantities listed are for each pair of doors or for each single door.
B. This hardware schedule was prepared by.

Ingersoll Rand Security Technology
735 W. SR 434, Suite H
Longwood, FL 32750
Ph: 407-571-2000
Fax 407-571-2006

Hardware Group No. 01
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	3CB1 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	1690EO	628	FAL
1	EA	PANIC HARDWARE	1692NL-OP	628	FAL
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
2	EA	OFFSET DOOR PULL	8190-0-O	630	IVE
2	EA	SURFACE CLOSER	4041	689	LCN
1	EA	THRESHOLD	896V	AL	NGP
1	EA	BALANCE	FURNISHED UNDER SECTION 08400		B/O

Hardware Group No. 02
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	3CB1 4.5 X 4.5 NRP	630	IVE
2	EA	SURFACE BOLT	SB360T-12	603	IVE
1	EA	STOREROOM LOCK	L9080P 06A	626	SCH
2	EA	SURFACE CLOSER	4041	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	5050B	BRN	NGP
1	EA	THRESHOLD	896V	AL	NGP
1	EA	METAL Z-ASTRAGAL	BY DOOR SUPPLIER	GRY	B/O

Hardware Group No. 03
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3CB1 4.5 X 4.5 NRP	630	IVE
1	EA	CLASSROOM LOCK	L9070P 06A	626	SCH
1	EA	SURFACE CLOSER	4041	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	5050B	BRN	NGP
1	EA	THRESHOLD	896V	AL	NGP

Hardware Group No. 04
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	FIRE EXIT HARDWARE	EL9827EO-F	626	VON
1	EA	FIRE EXIT HARDWARE	EL9827L-F 996L	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	CORE ONLY	23-030	626	SCH
2	EA	AUTO-EQUALIZER	4811 STD	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
1	SET	SEALS	5050B	BRN	NGP
2	EA	DOOR SWEEP	200NA	AL	NGP

1	EA	THRESHOLD	513	AL	NGP
1	EA	CONTROL BOX	7982	GRY	LCN
1		WIRING DIAGRAM	BY HARDWARE SUPPLIER		B/O
1	FT	PNEUMATIC TUBING	925	CLR	LCN
2	EA	TRANSMITTER KIT	8310-844		LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852		LCN

Hardware Group No. 05
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	CLASSROOM LOCK	ND70PD RHO	626	SCH
2	EA	SURFACE CLOSER	4041	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	5050B	BRN	NGP
2	EA	DOOR SWEEP	200NA	AL	NGP
1	EA	THRESHOLD	513	AL	NGP
1	EA	METAL Z-ASTRAGAL	BY DOOR SUPPLIER	GRY	B/O

Hardware Group No. 06
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4041	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	5050B	BRN	NGP
1	EA	DOOR SWEEP	200NA	AL	NGP
1	EA	THRESHOLD	513	AL	NGP

Hardware Group No. 07
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	CLASSROOM LOCK	ND70PD RHO	626	SCH
1	EA	SURFACE CLOSER	4041 DEL	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	5050B	BRN	NGP
1	EA	DOOR SWEEP	200NA	AL	NGP
1	EA	THRESHOLD	513	AL	NGP

Hardware Group No. 08
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PRIVACY SET	ND40S RHO	626	SCH
1	EA	SURFACE CLOSER	4041	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 09
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3CB1 4.5 X 4.5	630	IVE
1	EA	PUSH PLATE	8200 6" X 16"	630	IVE
1	EA	PULL PLATE	8303-0 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4041	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 10
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3PB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53PD RHO	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 11
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3PB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53PD RHO	626	SCH
1	EA	OVERHEAD STOP	450S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 12
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	3PB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY SET	ND40S RHO	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 13
Provide each SL door(s) with the following:

Quantity	Description	Model Number	Finish	Mfr
1	ALL HARDWARE BY	DOOR SUPPLIER		B/O

Door No	HwSet	Door No	HwSet	Door No	HwSet
100	01				
101	10				
102	10				
103	08				
104	07				
105	06				
106	05				
107	05				
108	02				
109	NOT USED				
110	11				
111	11				
112	11				
113	11				
114	11				
115	03				
116	04				
117	10				
118	10				
119	10				
120	12				
121	10				
122	08				
123	09				
124	03				
125	02				
126	13				
127	13				
129	13				
130	13				
131	13				
132	11				
139	02				
140	04				
141	05				
142	03				
143	08				
144	08				

SECTION 08800 - GLAZING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:

Entrances and other doors.

Storefront construction.

DEFINITIONS

Manufacturer is used in this Section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced glazing standard.

Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's directions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.

SYSTEM PERFORMANCE REQUIREMENTS

General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

Glass Design: Glass thicknesses indicated on Drawings are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:

Minimum glass thickness, nominally, of lites in exterior walls is 6.0 mm (0.23 inch).

Tinted and heat-absorbing glass thicknesses for each tint indicated are the same throughout Project.

Normal thermal movement results from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on materials' actual surface temperatures due to both solar heat gain and nighttime sky heat loss.

Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

SUBMITTALS

General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

Product data for each glass product and glazing material indicated.

Samples for verification purposes of 12-inch-square samples of each type of glass indicated except for clear monolithic glass products, and 12-inch-long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.

Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements.

Separate certifications are not required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.

Compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed for adhesion.

Compatibility test report from manufacturer of insulating glass edge sealant indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, glazing tape, gaskets, setting blocks, and edge blocks.

Product test reports for each type of glazing sealant and gasket indicated, evidencing compliance with requirements specified.

Maintenance data for glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 1.

QUALITY ASSURANCE

Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

FGMA Publications: "FGMA Glazing Manual."

AAMA Publications: AAMA TIR-A7 "Sloped Glazing Guidelines" and "Glass Design for Sloped Glazing."

LSGA Publications: "LSGA Design Guide."

SIGMA Publications: TM-3000 "Vertical Glazing Guidelines" and TB-3001 "Sloped Glazing Guidelines."

Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.

Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.

Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:

Primary glass of each (ASTM C 1036) type and class indicated.

Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

Field-Constructed Mockups: Prior to glazing, erect mockups for each glass product indicated below to verify selections made under sample submittals and to demonstrate aesthetic effects and quality of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work:

Glass Products: Erect mockups with the following kinds of glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods:

Heat-strengthened coated glass.

Fully tempered glass.

Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

DELIVERY, STORAGE, AND HANDLING

Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

PROJECT CONDITIONS

Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

Install liquid sealants at ambient and substrate temperatures above 40 deg F (4.4 deg C).

WARRANTY

General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

Manufacturer's Warranty on Coated Glass Products: Submit written warranty signed by coated glass manufacturer agreeing to furnish replacements for those coated glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions.

Warranty Period: Manufacturer's standard but not less than 5 years after date of Substantial Completion.

PART 2 - PRODUCTS

MANUFACTURERS

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in Product Data Sheets at end of this Section.

PRIMARY FLOAT GLASS PRODUCTS

HEAT-TREATED LAMINATE SAFETY GLASS

Coated, Tinted, Heat-Treated Laminate Safety Glass: 1 5/16” IG similar to Rochester Insulated Glass, Inc. or equal, www.rochesterinsulatedglass.com. Glazing composition is ¼” tempered, ½” air space, ¼” clear 090 PVB, ¼” clear. Color selected from manufacture standard range.

Kind FT (fully tempered) where indicated.

COLORS: Selected from manufacturer standard ranges of colors.

WIRED GLASS

Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 1/4” thick; of form and mesh pattern indicated below:

Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:

Mesh m1 (diamond).

Manufacturers: Subject to compliance with requirements, provide heat-treated glass by one of the following companies.

AFG Industries, Inc.
PPG Industries, Inc.
Tempglass.

ELASTOMERIC GLAZING SEALANTS

General: Provide products of type indicated, complying with the following requirements:

Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.

Colors: Provide color of exposed joint sealants to comply with the following:

Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 requirements indicated on each Elastomeric Glazing Sealant Product Data Sheet at the end of this Section, including those referencing ASTM classifications for Type, Grade, Class and Uses.

Additional Movement Capability: Where additional movement capability is specified in Elastomeric Glazing Sealant Product Data Sheet, provide products, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, with the capability to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

Glazing Sealant for Fire-Resistant Glazing Products: Identical to product used in test assembly to obtain fire-resistive rating.

GLAZING TAPES

Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 800 for products indicated below:

AAMA 804.1.

AAMA 806.1.

AAMA 807.1.

Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.

Available Products: Subject to compliance with requirements, glazing tape that may be incorporated in the Work include, but is not limited to, the following:

Back-Bedding Mastic Glazing Tape With Spacer Rod:

PTI 303 Glazing Tape (with shim), Protective Treatments, Inc.
Pre-shimmed Tremco 440 Tape, Tremco, Inc.
PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.

Expanded Cellular Glazing Tape:

Norseal V-980 Closed-Cell Glazing Tape, Norton Company.

GLAZING GASKETS

Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.

Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

Neoprene, ASTM C 864.

Soft Compression Gaskets: Extruded or molded closed-cell, integral-skinned gaskets of material indicated below, complying with ASTM C 509, Type II, black, and of profile and hardness required to maintain watertight seal:

Neoprene.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following companies.

Manufacturers: Subject to compliance with requirements, provide products by one of the following companies.

Lock-Strip Gaskets:

Stanlock Div., Griffith Rubber Mills.

Preformed Gaskets:

Advanced Elastomer Systems, L.P.
Schnee-Morehead, Inc.
Tremco, Inc.

MISCELLANEOUS GLAZING MATERIALS

General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.

Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.
Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).

Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

PART 3 - EXECUTION

EXAMINATION

Examine glass framing, with glazier present, for compliance with the following:

Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.

Presence and functioning of weep system.

Minimum required face or edge clearances.

Effective sealing between joints of glass-framing members.

Do not proceed with glazing until unsatisfactory conditions have been corrected.

PREPARATION

Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

GLAZING, GENERAL

Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

Protect glass from edge damage during handling and installation as follows:

Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.

Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.

Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:

Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.

Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.

Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

TAPE GLAZING

Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.

Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.

Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

Do not remove release paper from tape until just before each lite is installed.

Apply heel bead of elastomeric sealant.

Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

Apply cap bead of elastomeric sealant over exposed edge of tape.

GASKET GLAZING (DRY)

Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

Install gaskets so they protrude past face of glazing stops.

SEALANT GLAZING (WET)

Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

Tool exposed surfaces of sealants to provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

LOCK-STRIP GASKET GLAZING

Comply with ASTM C 716 and gasket manufacturer's printed recommendations. Provide supplementary wet seal and weep system unless otherwise indicated.

PROTECTION AND CLEANING

Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.

Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 08800

SECTION 09220 - PORTLAND CEMENT PLASTER

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Metal framing and furring.

Metal lath and accessories.

Plastic accessories.

Portland cement plaster.

Stucco finishes for soffits.

Acrylic-based finishes.

Portland cement plaster with embedded, exposed aggregate (marblecrete).

Sgraffito designs in colored portland cement plaster.

Related Sections: The following Sections contain requirements that relate to this Section:

Division 3 Autoclaved Concrete Panel

Division 5 Section "Cold-Formed Metal Framing" for load-bearing steel studs and joists.

Division 6 Section "Rough Carpentry" for wood framing and furring.

Division 9 Section "Gypsum Sheathing" for gypsum sheathing installed behind metal lath.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product Data for each product specified.

Samples for initial selection in the form of manufacturer's color charts consisting of actual units or sections of units at least 12 inches (300 mm) square showing the full range of colors, textures, and patterns available for each type of finish indicated.

Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
Include similar Samples of material for joints and accessories involving color selection.

Samples for verification in units at least 6 inches (300 mm) square of each type of finish indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

Material Certificates: Submit certificate signed by manufacturer for each kind of plaster aggregate certifying that materials comply with requirements.

QUALITY ASSURANCE

Fire-Test-Response Characteristics: Where fire-resistance-rated portland cement plaster assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

DELIVERY, STORAGE, AND HANDLING

Deliver cementitious materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.

Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

PROJECT CONDITIONS

Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

Cold-Weather Requirements: Provide heat and protection, temporary or permanent, as required to protect each coat of plaster from freezing for at least 24 hours after application. Distribute heat uniformly to prevent concentration of heat on plaster near heat sources; provide deflection or protective screens.

Warm-Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

Exterior Plaster Work: Do not apply plaster when ambient temperature is below 40 deg F (4 deg C).

Protect plaster against freezing when ambient temperature is below 40 deg F (4 deg C) by heating materials and providing temporary protection and heat as required by ACI 306R.

Interior Plaster Work: Maintain at least 50 deg F (10 deg C) temperature in areas to be plastered for at least 48 hours before, during, and after application.

Ventilation: Provide natural or mechanical means of ventilation to properly dry interior spaces after portland cement plaster has cured.

Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and other provisions necessary to minimize harmful spattering of plaster on other work.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Metal Framing and Supports:

Dietrich Industries, Inc.
National Gypsum Co.

Expanded-Metal Lath:

Dietrich Industries, Inc.
National Gypsum Co.
United States Gypsum Co.

Wire-Fabric Lath:

K-Lath Building Products.

Metal Accessories:

Fry Reglet Corporation.
National Gypsum Co.
United States Gypsum Co.

Plastic Accessories:

Alabama Metal Industries Corp. (AMICO).
Plastic Components, Inc.
Vinyl Corp.

Stucco:

Florida Stucco Corp.
United States Gypsum Co.

METAL SUPPORTS FOR SUSPENDED AND FURRED CEILINGS

General: Size metal ceiling supports to comply with ASTM C 1063, unless otherwise indicated.

Cast-in-Place and Postinstalled Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials, with holes or loops for attaching hanger wires; and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.

Cast-in-place type designed for attachment to concrete forms.

Chemical anchor.

Expansion anchor.

Wire for Hangers and Ties: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper.

Rod Hangers: Mild steel, zinc coated.

Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

Channels: Cold-rolled steel, minimum 0.0598-inch- (1.5-mm-) thick base (uncoated) metal and 7/16-inch- (11.1-mm-) wide flanges, and as follows:

Carrying Channels: 1-1/2 inches (38 mm) deep, 475 lb/1000 feet (0.7 kg/m).

Furring Channels: 3/4 inch (19 mm) deep, 300 lb/1000 feet (0.45 kg/m).

Finish: ASTM A 653, G60 (ASTM A 653M, Z180) hot-dip galvanized coating for framing where indicated.

Steel Studs for Furring Channels: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch- (5-mm-) wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

Thickness: As indicated.

Depth: As indicated.

Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) galvanized coating.

STEEL STUDS AND RUNNERS

General: Provide steel studs and runners complying with the following requirements:

Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) hot-dip galvanized coating.

Protective Coating: ASTM A 653, G40 (ASTM A 653M, Z90) hot-dip galvanized coating for framing members of exterior walls and within 10 feet (3 m) of exterior walls.

LATH

Expanded-Metal Lath: Comply with ASTM C 847 for material, type, configuration, and other characteristics indicated below.

Material: Fabricate expanded-metal lath from sheet metal conforming to the following:

Galvanized Steel: Structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) minimum coating designation, unless otherwise indicated.

Diamond-Mesh Lath: Comply with the following requirements:

Configuration: Flat.

Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

Configuration: Self-furring.

Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

Rib Lath: Comply with the following requirements:

Configuration: Flat, rib depth of not over 1/8 inch (3 mm).

Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

Woven-Wire Lath: ASTM C 1032, fabricated into 1-1/2-inch (38-mm) hexagonal-shaped mesh with minimum 0.0510-inch- (1.3-mm-) diameter, galvanized steel wire.

Welded-Wire Lath: ASTM C 933, fabricated into 2-by-2-inch (50-by-50-mm) openings with minimum 0.0625-inch- (1.6-mm-) diameter, galvanized steel wire.

Paper Backing: Where paper-backed lath is indicated, provide the following material factory bonded to back of lath. Comply with FS UU-B-790, Type I, grade and style as indicated below:

Vapor-Retardant Paper: Grade B, Style 1 with flame-spread rating of 25 per ASTM E 84.

ACCESSORIES

General: Comply with material provisions of ASTM C 1063 and the requirements indicated below; coordinate depth of accessories with thicknesses and number of plaster coats required.

Galvanized Steel Components: Fabricated from zinc-coated (galvanized) steel sheet complying with ASTM A 653, G40 (ASTM A 653M, Z90) minimum coating designation.

Metal Corner Reinforcement: Expanded, large-mesh, diamond-metal lath fabricated from zinc-alloy or welded-wire mesh fabricated from 0.0475-inch- (1.2-mm-) diameter, zinc-coated (galvanized) wire and specially formed to reinforce external corners of portland cement plaster on exterior exposures while allowing full plaster encasement.

Cornerbeads: Small nose cornerbeads fabricated from the following metal, with expanded flanges of large-mesh diamond-metal lath allowing full plaster encasement.

Galvanized Steel: Minimum 0.0172 inch (0.44 mm) thick.

Casing Beads: Square-edged style, with expanded flanges of the following material:

PVC Plastic: Minimum 0.035 inch (0.89 mm) thick.

Galvanized Steel: Minimum 0.0172 inch (0.44 mm) thick.

Curved Casing Beads: Square-edged style, fabricated from aluminum coated with clear plastic, preformed into curve of radius indicated.

Control Joints: Prefabricated, of material and type indicated below:

Galvanized Steel: Minimum 0.0172 inch (0.44 mm) thick.

One-Piece Type: Folded pair of nonperforated screeds in M-shaped configuration, with expanded or perforated flanges.

Two-Piece Type: Pair of casing beads with back flanges formed to provide slip-joint action, adjustable for joint widths from 1/8 to 5/8 inch (3 to 16 mm).

Provide removable protective tape on plaster face of control joints.

Foundation Sill (Weep) Screed: Manufacturer's standard profile designed for use at sill plate line to form plaster stop and prevent plaster from contacting damp earth, fabricated from zinc-coated (galvanized) steel sheet.

Lath Attachment Devices: Material and type required by ASTM C 1063 for installations indicated.

PLASTER MATERIALS

Base-Coat Cements: Type as indicated below:

Portland cement, ASTM C 150, Type I.

Job-Mixed Finish-Coat Cement: Material and color as indicated below:

Portland cement, ASTM C 150, Type I.

Cement Color: Gray.

Stucco Finish Coat: Manufacturer's standard factory-packaged stucco, including portland cement, aggregate, coloring agent, and other proprietary ingredients.

Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S; or special hydrated lime for masonry purposes, ASTM C 207, Type S.

Sand Aggregate for Base Coats: ASTM C 897.

Aggregate for Finish Coats: ASTM C 897 system and as indicated below:

Manufactured or natural sand, white in color.

Manufactured or natural sand, in color matching Architect's sample.

MISCELLANEOUS MATERIALS

Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminates, manufactured for use in portland cement plaster.

Water for Mixing and Finishing Plaster: Potable.

Bonding Agent: ASTM C 932.

Acid-Etching Solution: Muriatic acid (10 percent solution of commercial hydrochloric acid) mixed 1 part to not less than 6 nor more than 10 parts water.

Dash-Coat Material: 2 parts portland cement to 3 parts fine sand, mixed with water to a mushy-paste consistency.

Asphalt-Saturated Felt: ASTM D 226, Type I (No. 15), nonperforated.

Line Wire: 0.0475-inch- (1.2-mm-) diameter, zinc-coated (galvanized), soft, annealed steel wire.

Steel drill screws complying with ASTM C 1002 for fastening metal lath to wood or steel members less than 0.033 inch (0.84 mm) thick.

Thermal Insulation: Material as indicated below, of thickness and width to fill voids formed by Z-furring members:

Unfaced Mineral-Fiber Blanket Insulation: Combine mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing) and as follows:

Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

Flame-spread and smoke-developed ratings of 75 and 450, respectively, according to ASTM E 84.

ACOUSTICAL SEALANT

Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

Available Products: Subject to compliance with requirements, acoustical sealants that may be incorporated into the Work include, but are not limited to, the following:

Products: Subject to compliance with requirements, provide one of the following:

Acoustical Sealant for Exposed and Concealed Joints:

PL Acoustical Sealant; ChemRex, Inc., Contech Brands.
AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
SHEETROCK Acoustical Sealant; United States Gypsum Co.

Acoustical Sealant for Concealed Joints:

BA-98; Pecora Corp.
Tremco Acoustical Sealant; Tremco, Inc.

PLASTER MIXES AND COMPOSITIONS

General: Comply with ASTM C 926 for base- and finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated.

Base-Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.

Fiber Content: Add fiber to following mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's written instructions but do not exceed 1 lb/cu. ft. (16 kg/cu. m) of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

Three-Coat Work over Metal Lath and Concrete Unit Masonry: Base-coat proportions as indicated below:

Scratch Coat: 1 part portland cement, 1 to 2 parts masonry cement, 2-1/2 to 4 parts aggregate.
Brown Coat: 1 part portland cement, 1 to 2 parts masonry cement, 3 to 5 parts aggregate.

Two-Coat Work over Concrete Unit Masonry: Base-coat proportions as indicated below:

Job-Mixed Finish Coats: Proportion materials for finish coats in parts by volume for cementitious materials and parts by volume per sum of cementitious materials to comply with the following requirements:

Proportions using sand aggregates as indicated below:

1 part portland cement, 1-1/2 to 2 parts lime, 3 parts sand.

Factory-Prepared Finish Coats: Add water only; comply with finish coat manufacturer's written instructions.

Stucco Finish Coat: Add water only; comply with stucco manufacturer's written instructions.

MIXING

Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 - EXECUTION

INSTALLATION OF LATH AND FURRING, GENERAL

Standards: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with requirements of ASTM C 1063.

Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, handrails, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable written instructions of lath and furring manufacturer.

Isolation: Where lathing and metal support system abuts building structure horizontally and where partition or wall abuts overhead structure, sufficiently isolate from structural movement to prevent transfer of loading from building structure. Install slip- or cushion-type joints to absorb deflections but maintain lateral support.

Frame both sides of control joints independently and do not bridge joints with furring and lathing or accessories.

Install additional framing, furring, runners, lath, and beads, as required to form openings and frames for other work as indicated. Coordinate support system for proper support of framed work that is not indicated to be supported independently of metal furring and lathing system.

INSTALLATION OF CEILING SUSPENSION SYSTEMS

Preparation and Coordination: Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure inserts and other structural anchorage provisions have been installed to receive ceiling hangers in a manner that will develop their full strength and at spacings required to support ceiling.

Furnish concrete inserts, and other anchorage devices indicated, to other trades for installations well in advance of time needed for coordination with other work.

Hanger Installation: Attach hangers to structure above ceiling to comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with referenced standards.

Do not attach hangers to metal deck tabs.

Install ceiling suspension system components of sizes and spacings indicated, but not in smaller sizes or greater spacings than those required by referenced lathing and furring installation standards.
BELOW ARE EXAMPLES BASED ON CHANNEL SIZES LISTED IN PART 2. DELETE IF INFORMATION IS INDICATED ON DRAWINGS. REVISE IF OTHER SIZES, MATERIALS, OR SPACINGS ARE REQUIRED.

Wire Hangers: Space 0.16-inch- (4-mm-) diameter wire hangers not over 48 inches (1219 mm) o.c., parallel with and not over 36 inches (914 mm) perpendicular to direction of carrying channels, unless otherwise indicated, and within 6 inches (152 mm) of carrying channel ends.

Carrying Channels: Space carrying channels not over 36 inches (914 mm) o.c. with 48-inch (1219-mm) o.c. hanger spacing.

Furring Channels to Receive Metal Lath: Space furring channels not over 16 inches (406 mm) o.c. for 3.4-lb/sq. yd. (1.8-kg/sq. m) diamond-mesh lath, 19 inches (483 mm) o.c. for 3.4-lb/sq. yd. (1.8-kg/sq. m) flat rib lath, or 24 inches (609 mm) o.c. for 3.4-lb/sq. yd. (1.8-kg/sq. m), 3/8-inch (9.5-mm) rib lath.

LATHING

Install metal lath for the following applications where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced ML/SFA specifications and ASTM lathing installation standards.

Suspended and furred ceilings using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, diamond-mesh lath.

Vertical metal framing and furring using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, diamond-mesh lath and cold-rolled channel stud framing.

Ceramic-tile setting beds using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, diamond-mesh lath.

Exterior sheathed wall surfaces using woven-wire lath with 1-1/2-inch (38-mm) hexagonal-shaped mesh with minimum 0.0510-inch- (1.3-mm-) diameter, galvanized steel wire.

Monolithic surfaces using 3.4-lb/sq. yd. (1.8-kg/sq. m) minimum weight, self-furring, diamond-mesh lath or vertical metal framing and furring as required for plaster thickness.

PREPARATIONS FOR PLASTERING

Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work.

Etch concrete and concrete unit masonry surfaces indicated for direct plaster application. Scrub with acid-etching solution on previously wetted surface and rinse thoroughly with clean water. Repeat application, if necessary, to obtain adequate suction and mechanical bond of plaster (where dash coat, bonding agent, or additive is not used).

Apply bonding agent on concrete and concrete unit masonry surfaces indicated for direct plaster application; comply with manufacturer's written instructions for application.

Apply dash coat on concrete surfaces indicated for direct plaster application. Moist-cure dash coat for at least 24 hours after application and before plastering.

Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

Refer to Division 6 Sections for installing permanent wood grounds, if any.

Flashing: Refer to Division 7 Sections for installing flashing as indicated.

Surface Conditioning: Immediately before plastering, dampen concrete and concrete unit masonry surfaces that are indicated for direct plaster application, except where a bonding agent has been applied. Determine and apply amount of moisture and degree of saturation that will result in optimum suction for plastering.

INSTALLATION OF PLASTERING ACCESSORIES

General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering. Install accessories of type indicated at following locations:

External Corners: Install corner reinforcement at external corners.

Terminations of Plaster: Install casing beads, unless otherwise indicated.

Control Joints: Install at locations indicated or, if not indicated, at locations complying with the following criteria and approved by Architect:

Where an expansion or contraction joint occurs in surface of construction directly behind plaster membrane.

Distance between Control Joints: Not to exceed 18 feet (5.4 m) in either direction or a length-to-width ratio of 2-1/2 to 1.

Wall Areas: Not more than 144 sq. ft. (13 sq. m).

Horizontal Surfaces: Not more than 100 sq. ft. (9 sq. m) in area.

Where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.

PLASTER APPLICATION

Plaster Application Standard: Apply plaster materials, composition, and mixes to comply with ASTM C 926.

Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials.

Do not use excessive water in mixing and applying plaster materials.

Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed at any location on surface.

Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, and before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches (152 mm) at each jamb anchor.

Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.

Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where interior plaster is not terminated at metal frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.

Number of Coats: Apply plaster of composition indicated, to comply with the following requirements:

Three Coats: Over the following plaster base:

Metal lath.

Concrete Unit Masonry cast -in-place concrete.

Finish Coats: Apply finish coats to comply with the following requirements:

Float Finish: Apply finish coat to a minimum thickness of 1/8 inch (3 mm) to completely cover base coat, uniformly floated to a true even plane with fine-textured finish matching Architect's sample.

Sand Finish: Machine-apply finish-coat plaster in 2 coats evenly and uniformly to produce textured finish matching Architect's sample.

Moist-cure plaster base and finish coats to comply with ASTM C 926, including written instructions for time between coats and curing in "Annex A2 Design Considerations."

CUTTING AND PATCHING

Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

CLEANING AND PROTECTING

Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris.

Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure plaster work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09220

SECTION 09255 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Nonload-bearing steel framing members for gypsum board assemblies.

Gypsum board assemblies attached to steel framing.

Cementitious backer units installed with gypsum board assemblies for ceramic tile installation.

Access doors for ceiling

Related Sections: The following Sections contain requirements that relate to this Section:

Division 5 Section "Cold-Formed Metal Framing" for load-bearing steel framing and/or metal stud partition framing.

Division 6 Section "Rough Carpentry" for wood blocking and furring, and gypsum sheathing applied over wood framing.

Division 9 Section "Tile" for cementitious backer units installed as substrates for ceramic tile.

DEFINITIONS

Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

ASSEMBLY PERFORMANCE REQUIREMENTS

Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

SUBMITTALS

Product Data from manufacturer for each type of product specified.

QUALITY ASSURANCE

Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:

Fire-Resistance Ratings: As indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

DELIVERY, STORAGE, AND HANDLING

Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

PROJECT CONDITIONS

Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F (4 deg C). For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F (10 deg C) for 48 hours before application and continuously after until dry. Do not exceed 95 deg F (35 deg C) when using temporary heat sources.

Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Grid Suspension Assemblies:

Armstrong World Industries, Inc.
Chicago Metallic Corp.
USG Interiors, Inc.
Worthington Steel Company (formerly National Rolling Mills).

Gypsum Board and Related Products:

Domtar Gypsum.
Georgia-Pacific Corp.
National Gypsum Co.; Gold Bond Building Products Division.
United States Gypsum Co.

Available Products: Subject to compliance with requirements, products that may be incorporated in the Work where proprietary gypsum wallboard is indicated include, but are not limited to, the following:

Products: Subject to compliance with requirements, provide one of the following products where proprietary gypsum wallboard is indicated:

Gyprock Fireguard C Gypsum Board; Domtar Gypsum.
Firestop Type C; Georgia-Pacific Corp.
Fire-Shield G; National Gypsum Co.; Gold Bond Building Products Division.
SHEETROCK Brand Gypsum Panels, FIRECODE C Core; United States Gypsum Co.
SHEETROCK Brand Gypsum Panels, ULTRACODE Core; United States Gypsum Co.

STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

General: Provide components complying with ASTM C 754 for conditions indicated.

Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190 conducted by a qualified independent testing agency.

Wire Ties: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.062 inch (1.6 mm) thick.

Wire Hangers: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper, 0.162-inch (4.1-mm) diameter.

Hanger Rods: Mild steel and zinc coated or protected with rust-inhibitive paint.

Flat Hangers: Mild steel and zinc coated or protected with rust-inhibitive paint.

Angle-Type Hangers: Angles with legs not less than 7/8 inch (22.2 mm) wide, formed from 0.0635-inch- (1.6-mm-) thick galvanized steel sheet complying with ASTM A 653, G 90 (ASTM A 653M, Z 180) coating designation, with bolted connections and 5/16-inch (8-mm) diameter bolts.

Channels: Cold-rolled steel, 0.0598-inch (1.5-mm) minimum thickness of base (uncoated) metal and 7/16-inch- (11.1-mm-) wide flanges, and as follows:

Carrying Channels: 2 inches (50.8 mm) deep, 590 lb/1000 feet (88 kg/100 m), unless otherwise indicated.

Carrying Channels: 1-1/2 inches (38.1 mm) deep, 475 lb/1000 feet (70 kg/100 m), unless otherwise indicated.

Furring Channels: 3/4 inch (19.1 mm) deep, 300 lb/1000 feet (45 kg/100 m), unless otherwise indicated.

Finish: ASTM A 653, G 60 (ASTM A 653M, Z 180) hot-dip galvanized coating for framing for exterior soffits and where indicated.

Steel Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 653 (ASTM A 653M) or ASTM A 568 (ASTM A 568M) to form 1/2-inch- (12.7-mm-) deep channel of the following configuration:

Single- or Double-Leg Configuration: Asymmetric-shaped channel with face connected to a single flange by a single-slotted leg (web) or hat-shaped channel, with 1-1/2-inch- (38.1-mm-) wide face connected to flanges by double-slotted or expanded-metal legs (webs).

Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross-furring members that interlock to form a modular supporting network.

In locations to receive cementitious backer units.

Where indicated.

GYPSUM BOARD PRODUCTS

General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

Widths: Provide gypsum board in widths of 48 inches (1219 mm).

Gypsum Wallboard: ASTM C 36 and as follows:

Type: Regular for vertical surfaces, unless otherwise indicated.

Type: Sag-resistant type for ceiling surfaces.

Type: Proprietary type as required for specific fire-resistance-rated assemblies.

Edges: Tapered.

Thickness: 1/2 inch (12.7 mm), for ceilings..

Thickness: 5/8 inch (15.9 mm) for walls.

Water-Resistant Gypsum Backing Board: ASTM C 630 and as follows:

Type: Regular, unless otherwise indicated.

Thickness: 5/8 inch (15.9 mm)

Gypsum Sheathing Board: ASTM C 79:

Type: Exterior, regular, unless otherwise indicated.

Thickness: 5/8 inch (15.9 mm)

TRIM ACCESSORIES

Accessories for Interior Installation: Cornerbead, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:

Material: Formed metal or plastic, with metal complying with the following requirement:
Steel sheet zinc coated by hot-dip or electrolytic process, or steel sheet coated with aluminum or rolled zinc.

Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:

Cornerbead on outside corners, unless otherwise indicated.

LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.

L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.

U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.

One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

JOINT TREATMENT MATERIALS

General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

Use pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

Joint Tape for Cementitious Backer Units: As recommended by cementitious backer unit manufacturer.

Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

Ready-Mixed Formulation: Factory-mixed product.

Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.

Topping compound formulated for fill (second) and finish (third) coats.

All-purpose compound formulated for both taping and topping compounds.

Joint Compound for Cementitious Backer Units: Material recommended by cementitious backer unit manufacturer.

ACOUSTICAL SEALANT

Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following requirements:

Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

Available Products: Subject to compliance with requirements, acoustical sealants that may be incorporated in the Work include, but are not limited to, the following:

Products: Subject to compliance with requirements, provide one of the following:

Acoustical Sealant for Exposed and Concealed Joints:

PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
SHEETROCK Acoustical Sealant; United States Gypsum Co.

MISCELLANEOUS MATERIALS

General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

Spot Grout: ASTM C 475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

Steel drill screws complying with ASTM C 1002 for the following applications:

Fastening gypsum board to steel members less than 0.033 inch (0.84 mm) thick.

Fastening gypsum board to wood members.

Fastening gypsum board to gypsum board.

Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

Steel drill screws of size and type recommended by unit manufacturer for fastening cementitious backer units.

Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type I (blankets without membrane facing).

Mineral-Fiber Type: Fibers manufactured from glass, slag wool, or rock wool.

Extruded-Polystyrene Board Insulation: Rigid, cellular, polystyrene thermal insulation formed from a polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as the blowing agent to comply with ASTM C 578 for Type IV, and with the following surface-burning characteristics:

Flame-spread and smoke-developed ratings of 75 and 450, respectively, according to ASTM E 84.

TEXTURE FINISH PRODUCTS

Primer: Of type recommended by texture finish manufacturer.

Aggregated Finish for Ceilings: Factory-packaged proprietary drying type powder product formulated with aggregates for mixing with water at Project site to produce texture indicated below by spray application.

Sand textured finish.

Aggregate Finish for Walls: Factory-packaged proprietary drying-type powder product formulated with aggregate for mixing with water at Project site for spray application to produce texture indicated below:

Sand textured finish.

Available Products: Subject to compliance with requirements, texture finishes that may be incorporated in the Work include, but are not limited to, the following:

Products: Subject to compliance with requirements, provide one of the following products:

ACCESS PANEL: As indicated on drawings.

Equal to MYSTROM 24 x 24 and 24 x 36 as indicated on documents standard steel door.
Door 14 ga. cold rolled steel
Frame 16 ga. cold rolled steel
Hinge consealed spring pin hinge
Latch screwdriver can latch
Finish phosphate dipped and prime coatedpainted to match ceiling

PART 3 - EXECUTION

EXAMINATION

Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

PREPARATION

Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

Furnish concrete inserts and other devices indicated to other trades for installation well in advance of time needed for coordination with other construction.

Existing sprayed-on fireproofing remove only as much fireproofing as needed to complete installation of gypsum board assemblies without reducing thickness of fireproofing below that is required to obtain fire-resistance rating indicated. Protect remaining fireproofing from damage.

INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

Screw furring members to wood framing.

Suspend ceiling hangers from building structural members and as follows:

Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.

Secure flat, angle, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or otherwise fail.

Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

Do not attach hangers to steel deck tabs.

Do not attach hangers to steel roof deck. Attach hangers to structural members.

Do not connect or suspend steel framing from ducts, pipes, or conduit.

Sway-brace suspended steel framing with hangers used for support.

Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.

Wire Hangers: 48 inches (1219 mm) o.c.

Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.

Furring Channels (Furring Members): 24 inches (610 mm) o.c.

Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring or grid suspension members are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) as measured both lengthwise on each member and transversely between parallel members.

Wire-tie or clip furring members to main runners and to other structural supports as indicated.

Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

Install thermal insulation as follows:

Erect insulation vertically and hold in place with Z-furring members spaced 24 inches (610 mm) o.c.

Erect insulation vertically and hold in place with Z-furring members spaced 600 mm o.c.

Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (600 mm) o.c.

At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation panel and continue in regular manner. At interior corners, space second member no more than 12 inches (300 mm) from corner and cut insulation to fit.

Until gypsum board is installed, hold insulation in place with 10-inch (250-mm) staples fabricated from 0.0625-inch (1.6-mm) diameter tie wire and inserted through slot in web of member.

APPLYING AND FINISHING GYPSUM BOARD, GENERAL

Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

Attach gypsum panels to framing provided at openings and cutouts.

Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Instead, float gypsum panels over these members using resilient channels or provide control joints to counteract wood shrinkage.

Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches (813 mm) wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.

Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.

Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.

Fit gypsum panels around ducts, pipes, and conduits.

Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum panels over wood framing, with floating internal corner construction.

Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.

Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.

GYPSUM BOARD APPLICATION METHODS

Single-Layer Application: Install gypsum wallboard panels as follows:

On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.

On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.

Stagger abutting end joints not less than one framing member in alternate courses of board.

Wall Tile Substrates: For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:

Install cementitious backer units to comply with ANSI A108.11 at locations indicated to receive wall tile.

Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

Fasten with screws.

INSTALLING TRIM ACCESSORIES

General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

Install cornerbead at external corners.

Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.

Install L-bead where edge trim can only be installed after gypsum panels are installed.

Install U-bead where indicated.

Install aluminum trim and other accessories where indicated.

Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

FINISHING GYPSUM BOARD ASSEMBLIES

General: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

Level 4 for gypsum board surfaces, unless otherwise indicated.

For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

APPLYING TEXTURE FINISHES

Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes according to texture finish manufacturer's instructions. Apply primer only to surfaces that are clean, dry, and smooth.

Texture Finish Application: Mix and apply finish to gypsum panels and other surfaces indicated to receive texture finish according to texture finish manufacturer's directions. Using powered spray equipment, produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray as recommended by texture finish manufacturer to prevent damage.

FIELD QUALITY CONTROL

Above-Ceiling Observation: Architect will conduct an above-ceiling observation prior to installation of gypsum board ceilings and report any deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

Notify Architect one week in advance of the date and the time when the Project, or part of the Project, will be ready for an above-ceiling observation.

Prior to notifying Architect, complete the following in areas to receive gypsum board ceilings:

Installation of 80 percent of lighting fixtures, powered for operation.

Installation, insulation, and leak and pressure testing of water piping systems.

Installation of air duct systems.

Installation of air devices.

Installation of mechanical system control air tubing.

Installation of ceiling support framing.

CLEANING AND PROTECTION

Promptly remove any residual joint compound from adjacent surfaces.

Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 09255

SECTION 09300 - TILE

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes installation of contract provided tile.

This Section includes the following:

Related Sections: The following sections contain requirements that relate to this Section:

Division 2 Section "Selective Demolition" for removal of existing carpet tile.

SUBMITTALS

General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

Product data, including installation instructions, for each type of product specified.

Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

Locate precisely each joint and crack in tile substrates by measuring, record measurements on shop drawings, and coordinate them with tile joint locations, in consultation with Architect.

Provide section details, drawn to scale and dimensioned, depicting exact profile of all stone thresholds. Dimensions shall reflect field verification of actual conditions.

Samples for verification purposes of each item listed below, prepared on samples of size and construction indicated, products involve color and texture variations, in sets showing full range of variations expected.

Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on plywood or hardboard backing and grouted.

Full-size units of each type of trim and accessory for each color required.

Stone thresholds in 6-inch lengths.

Master grade certificates for each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

QUALITY ASSURANCE

Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

Preinstallation Conference: Conduct conference at Project site following approval of submittals and prior to tile installation.

Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect of scheduled meeting dates (48 hours minimum notice).

Review the preparations for the tile installation including requirements for the following:

Contract Documents
Options
Deliveries
Shop Drawings, Product Data, and quality-control samples
Possible conflicts
Time schedules
Weather limitations
Manufactuer's recommendations
Warranty requirements
Compatibility of materials
Acceptability of substrates
Temporary facilities
Space and access limitations
Governing regulations
Safety
Inspecting and testing requirements
Required performance results
Protection

Record significant discussions and agreements and disagreements of the conference, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.

Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of work and reconvene the conference at the earliest feasible date.

DELIVERY, STORAGE, AND HANDLING

Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

EXTRA MATERIALS

Deliver extra materials to Owner. Furnish extra materials that match products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

PRODUCTS, GENERAL

Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials compling with the following requirements:

Match color, texture, and pattern indicated by reference to manufacturer's standard designations for these characteristics.

Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show

the same range in colors as those taken from other packages and match approved samples.

TILE MANUFACTURERS

Amerian Olean Product
DAL-TILE

TILE PRODUCTS

Ceramic Mosaic Floor Tile for Restrooms:

1.	Moisture Absorption	0 to 0.5 percent
2.	Size	2" x 2" x 1/8" inch
3.	Shape	square
4.	Edge	cushioned
5.	Surface Finish	slip resistant
6.	Color	as selected from mfg. full color line by Architect
7.	Mounted Sheet Size	12 x 12 inches
8.	Wall Base	2” x 2” x 1/8” inch with cove

Porcelain Ceramic Wall Tile: ANSI A 137.1 conforming to the following:

1.	Moisture Absorption	0 to 0.5
2.	Size	Nominal 4” x 4” x 1/4” modular, for joint alignment with ceramic floor tile
3.	Shape	Square
4.	Edge	All purpose edge
5.	Surface Finish	Glazed as selected

Unglazed Quarry Tile: Provide square-edged flat tile complying with the following requirements:

Facial Dimensions: 6 by 6 inches (152 by 12 mm).

Thickness: 3/8”
Grout Joint: 1/4”

STONE THRESHOLDS

White Marble Thresholds granite used at thresholds shall be equivalent to 'Cashmere White' as produced by Florence Mabrble and Granite. Provide with honed finish in profiles as detailed on drawing. Field verify all measurements and conditions. Prior to fabrication, provide sample for material and finish verification an submit shop drawings of each condition, with profiles drawn at full scale.

SETTING MATERIALS

Provide one of the following manufacturers or equal for thin setting ceramic and mosaic tiles. Color as selected from full range of colors:

1. Jamo
2. Laticrete
3. Bonsal

GROUTING MATERIALS

Provide one of the following manufacturers or equal for grouting ceramic and mosaic tiles. Color as selected from full range of colors:

1. Laticrete
2. Customer Building
3. American Olean

Grout: ANS1 A118.6 Tile Grout, latex additive color as selected.

GROUT SEALER

Silicone Grout Sealer, as manufactured by, TEC Incorporated.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

Verify that substrates for setting tile are firm, dry, clean, and acceptable for installation of tile and related work.

INSTALLATION, GENERAL

Installation of all tile work, including but not limited to, setting materials, tile, grout and sealer shall be in strict accordance with the manufacturers' recommendations and the TCA Handbook for Ceramic Tile Installation. Said manufacturers' recommendations, in the form of approval submittals, shall be on-site and available for reference, at all

times during the installation.

Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

Existing building plans do not indicate expansion control joints in existing slab. If discovered during carpet removal, notify Architect, for advisement of revised joint locations in new tile work.

Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise recommended my manufacturer of setting materials.

CLEANING AND PROTECTION

Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

Remove latex-portland cement grout residue from tile as soon as possible.

Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

Sealing: Provide two (2) separate applications of Silicone Grout Sealer in accordance with manufacturer recommendations. Do not proceed with installation of sealer until tile installation is complete and reviewed by Architect. Following application of sealer, clean up per manufacturers' recommendations.

END OF SECTION 09300

SECTION 09512 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Ceilings consisting of acoustical tiles and concealed suspension systems.

Related Sections include the following:

Division 9 "Gypsum Board Assemblies."

SUBMITTALS

Product Data: For each type of product specified.

Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

Ceiling suspension system members.

Method of attaching suspension system hangers to building structure.

Initial direct-access openings.

Ceiling-mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.

Minimum Drawing Scale: 1/4 inch = 1 foot (1:48).

Samples for Initial Selection: Manufacturer's color charts consisting of actual acoustical tiles or sections of acoustical tiles, suspension systems, and moldings showing the full range of colors, textures, and patterns available for each type of ceiling assembly indicated.

Samples for Verification: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

Full-size samples of each acoustical tile type, pattern, and color.

Set of 12-inch- (300-mm-) long samples of concealed suspension system members.

Set of 12-inch- (300-mm-) long samples of exposed moldings for each color and system type required.

Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

Product Test Reports: Indicate compliance of acoustical tile ceilings and components with requirements based on comprehensive testing of current products.

Research/Evaluation Reports: Evidence of acoustical tile ceiling's and components' compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer who has completed acoustical tile ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Source Limitations for Ceiling Units: Obtain each acoustical ceiling tile from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

Source Limitations for Suspension System: Obtain each suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

Obtain both acoustical ceiling tiles and suspension system from the same manufacturer.

Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

DELIVERY, STORAGE, AND HANDLING

Deliver acoustical tiles and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

PROJECT CONDITIONS

Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

COORDINATION

Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

EXTRA MATERIALS

Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

Acoustical Ceiling Units: Full-size units equal to 2.0 percent of amount installed.

Suspension System Components: Quantity of each grid and exposed component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

MANUFACTURERS

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the Acoustical Tile Ceiling Schedule at the end of Part 3.

ACOUSTICAL TILES, GENERAL

Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

Mounting Method for Measuring Noise Reduction Coefficient: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.

Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.

Where appearance characteristics of acoustical tiles are indicated by referencing ASTM E 1264 pattern designations and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range of products that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

Tile Characteristics: Comply with requirements indicated in the Acoustical Tile Ceiling Schedule at the end of Part 3, including those referencing ASTM E 1264 classifications.

METAL SUSPENSION SYSTEMS, GENERAL

Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

Metal Suspension System Characteristics: Comply with requirements indicated in the Acoustical Panel Ceiling Schedule at the end of Part 3.

Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

Postinstalled Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's product designations, including splice plates, corner pieces, and attachment and other clips, complying with the following requirements:

Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221/B 221M for alloy and temper 6063-T5.

Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.

Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Comply with paint manufacturer's written instructions for applying and baking and for minimum dry film thickness.

Organic Coating: Manufacturer's standard thermosetting coating system with a minimum dry film thickness of 0.8 to 1.2 mils (0.02 to 0.03 mm).

Color: As selected by Architect from manufacturer's standard colors.

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Armstrong World Industries, Inc.
Celotex Corporation (The); Building Products Division; Architectural Ceilings Marketing Dept.
Chicago Metallic Corporation.
Fry Reglet Corporation.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and structural framing to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical tile ceilings.

Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other Sections.

Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordinating other work.

Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width units at borders, and comply with layout shown on reflected ceiling plans.

INSTALLATION

General: Install acoustical tile ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.

Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."

U.B.C.'s "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": U.B.C. Standard 25-2.

Suspend ceiling hangers from building's structural members and as follows:

Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, powder-actuated fasteners, or drilled-in anchors that extend through forms into concrete.

Do not attach hangers to steel deck tabs.

Do not attach hangers to steel roof deck. Attach hangers to structural members.

Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.

Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.

Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m). Miter corners accurately and connect securely.

Do not use exposed fasteners, including pop rivets, on moldings and trim.

Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

Arrange directionally patterned acoustical tiles as follows:

As indicated on reflected ceiling plans.

Install tiles with pattern running in one direction parallel to long axis of space.

Install tiles with pattern running in one direction parallel to short axis of space.

Install tiles in a basket-weave pattern.

Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.

Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.

Fabricate access units for special suspension system access members and tile units modified as required to allow for removal of access units.

Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

CLEANING

Clean exposed surfaces of acoustical tile ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

Products: Similar to Armstrong Georgian 764 and 763 as indicated in drawings.
Similar to Armstrong Georgian 898 (for corridor only) UL P265.

Light Reflectance Coefficient: Not less than [LR 0.65.]

Ceiling Tile Schedule

Interior Application:

Type: Georgian (Armstrong) or equal

Noise Reduction Coefficient: [NRC 0.65.]

Thickness: [3/4 inch (19 mm).]

Size: 24" x 48"
24” x 24” as indicated on drawings

Suspension System for Acoustical Tile Ceiling: Where this designation is indicated, provide acoustical tile ceiling suspension system complying with the following:

Products: Similar to Armstrong Prelude Plus XL.

Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G01 (Z001) coating designation; other characteristics as follows:

Structural Classification: Intermediate-duty system.

END OF SECTION 09512

SECTION 09651 - RESILIENT TILE FLOORING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Vinyl composition floor tile.

Resilient wall base and accessories.

Related Sections include the following:

SUBMITTALS

Product Data: For each type of product specified.

Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.

Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.

For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches (300 mm) long, of each resilient accessory color and pattern specified.

Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.

Maintenance Data: For resilient floor tile to include in the maintenance manuals specified in Division 1.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.

Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

DELIVERY, STORAGE, AND HANDLING

Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

Store tiles on flat surfaces.

Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

PROJECT CONDITIONS

Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

Do not install products until they are at the same temperature as the space where they are to be installed.

Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

Install tiles and accessories after other finishing operations, including painting, have been completed.

Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.

Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

EXTRA MATERIALS

Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

Furnish not less than one box for each 50 boxes or fraction thereof, of each type, color, pattern, class, wearing surface, and size of resilient tile flooring installed.

Furnish not less than 10 linear feet (3 linear m) for each 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient accessory installed.

Deliver extra materials to Owner.

PART 2 - PRODUCTS

MANUFACTURERS

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Resilient Tile Flooring Schedule at the end of Part 3.

RESILIENT TILE

Vinyl Composition Floor Tile: Products complying with ASTM F 1066 and with requirements specified in the Resilient Tile Flooring Schedule.

RESILIENT ACCESSORIES

Vinyl Wall Base: Products complying with FS SS-W-40, Type II and with requirements specified in the Resilient Tile Flooring Schedule.

INSTALLATION ACCESSORIES

Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

EXAMINATION

Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.

Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.

Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

For wood subfloors, verify the following:

Underlayment over subfloor complies with requirements specified in Division 6 Section "Rough Carpentry."

Underlayment surface is free of irregularities and substances that may interfere with adhesive bond, show through surface, or stain flooring.

Do not proceed with installation until unsatisfactory conditions have been corrected.

PREPARATION

General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

TILE INSTALLATION

General: Comply with tile manufacturer's written installation instructions.

Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.

Lay tiles square with room axis, unless otherwise indicated.

Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.

Lay tiles with grain running in one direction.

Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

Extend tiles into toe spaces, door reveals, closets, and similar openings.

Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.

Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

Hand roll tiles according to tile manufacturer's written instructions.

RESILIENT ACCESSORY INSTALLATION

General: Install resilient accessories according to manufacturer's written installation instructions.

Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

Do not stretch base during installation.

On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

Install premolded outside corners before installing straight pieces.

Install premolded outside and inside corners before installing straight pieces.

Form outside corners on job from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.

Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.

CLEANING AND PROTECTING

Perform the following operations immediately after installing resilient products:

Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.

Sweep or vacuum floor thoroughly.

Do not wash floor until after time period recommended by flooring manufacturer.

Damp-mop floor to remove marks and soil.

Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.

Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.

Use commercially available product acceptable to flooring manufacturer.

Coordinate selection of floor polish with Owner's maintenance service.

Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.

Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.

After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

RESILIENT TILE FLOORING SCHEDULE

Size: 12 by 12 inches (304.8 by 304.8 mm).

Vinyl Composition Tile VCT: Where this designation is indicated, provide vinyl composition floor tile complying with the following:

Armstrong
Tarkett

Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for tile complying with requirements indicated.

Wearing Surface: Smooth.

Thickness: 1/8 inch (3.2 mm).

Size: 12 by 12 inches

Vinyl Wall Base VWB: Where this designation is indicated, provide vinyl wall base complying with the following:

Armstrong
Roppe
Mercer

Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for vinyl wall base complying with requirements indicated.

Style: Cove with top-set toe.

Minimum Thickness: 1/8 inch (3.2 mm).

Height: 4 inches (101.6 mm).

Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet (29.26 m).

Outside Corners: Premolded or formed on job. Job formed.

Inside Corners: Premolded or formed on job.

Surface: Smooth.

Vinyl Accessory Molding: Where this designation is indicated, provide vinyl accessory molding complying with the following:

Armstrong
Roppe
Mercer

Color: As selected by Architect from manufacturer's full range of colors produced for vinyl accessory molding complying with requirements indicated.

Product Description: For all applicable locations, see Finish Schedule. Cap for cove vinyl sheet floor covering. Carpet bar for tackless installations. Carpet edge for glue-down applications. Carpet nosing. Nosing for resilient floor covering. Reducer strip for resilient flooring.

Profile and Dimensions: Manufacturer's standard product.

END OF SECTION 09651

SECTION 09900 - PAINTING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this section.

SUMMARY

This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

Prefinished items not to be painted include the following factory-finished components:

Finished mechanical and electrical equipment.
Light fixtures.
Switchgear.
Distribution cabinets.

Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

Foundation spaces.
Furred areas.
Utility tunnels.
Pipe spaces.
Duct shafts.
Elevator shafts.

Finished metal surfaces not to be painted include:

Anodized aluminum.
Stainless steel.
Chromium plate.
Copper.
Bronze.
Brass.
Operating parts not to be painted include moving parts of operating equipment such as the following:

Valve and damper operators.
Linkages.
Sensing devices.
Motor and fan shafts.

Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

Related Sections: The following sections contain requirements that relate to this section:

Division 5 Section "Structural Steel" for shop priming structural steel.

Division 5 Section "Metal Fabrications" for shop priming ferrous metal.

Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.

DEFINITIONS

"Paint" includes coating systems materials, primers, emulsion, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

SUBMITTALS

Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.

List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.

Samples for initial color selection in the form of manufacturer's color charts.

Samples for verification purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

Provide a list of material and application for each coat of each sample. Label each sample as to location and application.

QUALITY ASSURANCE

Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

Notify the Architect of problems anticipated using the materials specified.

Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full- coat finish samples on at least 100 sq. ft. of surface until required sheen, color and texture are obtained; simulate finished lighting conditions for review of in-place work.

Final acceptance of colors will be from job-applied samples.

Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

Used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.

DELIVERY, STORAGE, AND HANDLING

Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

Product name or title of material.
Product description (generic classification or binder type).
Federal Specification number, if applicable.
Manufacturer's stock number and date of manufacture.
Contents by volume, for pigment and vehicle constituents.
Thinning instructions.
Application instructions.
Color name and number.

Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

JOB CONDITIONS

Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.

Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:

Porter International (Porter).
Devoe and Raynolds Co. (Devoe).
The Glidden Company (Glidden).
Benjamin Moore and Co. (Moore).
PPG Industries, Pittsburgh Paints (Pittsburgh).
Pratt and Lambert (P & L).
The Sherwin-Williams Company (S-W).

MASONRY BLOCK FILLER

High-Performance Latex Block Filler: Heavy-duty latex block fillers used for filling open textured interior and exterior concrete masonry block before application of top coats:

Porter:	896 Acri-Fill Acrylic Block Filler.
Devoe:	52901 Bloxfil Acrylic Latex Block Filler.
Glidden:	5317 Ultra-Hide Acrylic Latex Block Filler.
Moore:	Moorcraft Block Filler #145.
Pittsburgh:	6-7 Latex Masonry Block Filler.
P & L:	Pro-Hide Plus Block Filler.
S-W:	Heavy-Duty Block Filler B42W46.

PRIMERS

Interior Flat Latex-Based Paint: Flat latex paint used as a primer over concrete and masonry under alkyd flat and semigloss enamel:

Porter:	689 Hi-Hide Interior Flat.
Devoe:	36XX Wonder-Tones Latex Flat Wall Paint.
Glidden:	5300 Ultra-Hide Flat Wall Paint.
Moore:	Moore's Latex Quick-Dry Prime Seal #201.
Pittsburgh:	80 Line Wallhide Flat Latex Paint.
P & L:	Vapex Latex Flat Wall Finish.
S-W:	Pro-Mar 200 Latex Flat B30W200.

Synthetic, Rust-Inhibiting Primer: Quick-drying, rust-inhibiting primer for priming ferrous metal on the exterior under full-gloss and flat alkyd enamel and on the interior under flat latex paint or odorless alkyd semigloss or alkyd gloss enamels:

Porter:	286 Fast Dry Metal Primer
Devoe:	14920 Bar-Ox Quick Dry Metal Primer, Red.
Glidden:	5210 Glid-Guard Universal Fast-Dry Metal Primer.
Moore:	Ironclad Retardo Rust-Inhibitive Paint #163.
Pittsburgh:	6-208 Red Inhibitive Metal Primer.
P & L:	Effecto Rust-Inhibiting Primer.
S-W:	Kem Kromik Metal Primer B50N2/B50W1.

Galvanized Metal Primer: Primer used to prime interior and exterior zinc-coated (galvanized) metal surfaces:

Porter:	290 Galvanized Primer.
Devoe:	13201 Mirrolac Galvanized Metal Primer.
Glidden:	5229 Glid-Guard All-Purpose Metal Primer.
Moore:	Ironclad Galvanized Metal Latex Primer #155.
Pittsburgh:	6-215/216 Speedhide Galvanized Steel Primer.
S-W:	Galvite B50W3.

UNDERCOAT MATERIALS

Interior Enamel Undercoat: Ready-mixed enamel for use on the interior as an undercoat over a primer on concrete or masonry under an odorless semigloss enamel:

Porter:	429 Enamel Undercoat.
Devoe:	8801 Velour Alkyd Enamel Undercoat.
Glidden:	4200 Spred Ultra Semi-Gloss Enamel.
Moore:	Moore's Alkyd Enamel Underbody #217.
Pittsburgh:	6-6 Speedhide Quick-Dry Enamel Undercoater.
P & L:	E6 Enamel Undercoater.
S-W:	Pro-Mar 200 Latex Wall Primer B28W200.

Interior Enamel Undercoat: Ready-mixed enamel for use on the interior as an undercoat over a primer on filled concrete masonry under an odorless semigloss enamel finish:

Porter:	429 Enamel Undercoat.
Devoe:	8801 Velour Alkyd Enamel Undercoat.
Glidden:	4200 Spred Ultra Semi-Gloss Enamel.
Moore:	Moore's Alkyd Enamel Underbody #217.
Pittsburgh:	6-6 Speedhide Quick-Dry Enamel Undercoater.
P & L:	Interior Trim Primer.
S-W:	Pro-Mar 200 Alkyd Semi-Gloss Enamel B34W200.

Interior Enamel Undercoat: Ready-mixed enamel for use as an undercoat over a primer on ferrous or zinc-coated metal under an interior alkyd semigloss enamel or a full-gloss alkyd enamel:

Porter:	429 Enamel Undercoat.
Devoe:	8801 Velour Alkyd Enamel Undercoat.
Glidden:	4200 Spred Ultra Semi-Gloss Enamel.
Moore:	Moore's Alkyd Enamel Underbody #217.
Pittsburgh:	6-6 Speedhide Quick-Dry Enamel Undercoater.
P & L:	Interior Trim Primer.
S-W:	Pro-Mar 200 Alkyd Enamel Undercoater B49W200.

EXTERIOR FINISH PAINT MATERIAL

Exterior Acrylic Emulsion: Quick-drying, flat, acrylic paint for use on the exterior over concrete, stucco, masonry (including concrete masonry block), and mineral-fiber-reinforced cement-panel surfaces:

Porter:	520 Exterior Acrylic Coating.
Devoe:	15XX Wonder-Shield Exterior Acrylic Latex Flat House Paint.

Glidden: 3525 Spred Glide-On.
Moore: Moore's Flat Exterior Latex Masonry & House Paint #105.
Pittsburgh: 72 Line Sun-Proof Acrylic Latex House Paint.
P & L: Vapex Latex Flat House Paint.
S-W: A-100 Acrylic Latex Flat Exterior Finish A-6 Series.

Alkyd Gloss Enamel: Weather-resistant high-gloss enamel for use over primed, zinc-coated (galvanized) metal surfaces and aluminum:

Porter: 4110 Glyptex Exterior Gloss Enamel.
Devoe: 70XX Mirrolac Interior/Exterior Alkyd Gloss Enamel.
Glidden: 4500-Line Glid-Guard Industrial Enamel.
Moore: Impervo High-Gloss Enamel #133.
Pittsburgh: 54 Line Quick-Dry Enamel.
P & L: Effecto Enamel.
S-W: Metalastic II Enamel B-53 Series.

INTERIOR FINISH PAINT MATERIAL

Interior Semigloss Odorless Alkyd Enamel: Low-odor, semigloss, alkyd enamel for use over a primer and undercoat on concrete, masonry (including concrete masonry block), plaster, wood, and hardboard and both ferrous and zinc-coated (galvanized) metal surfaces and over a primer on gypsum drywall:

Porter: 4139 Glyptex Satin Enamel.
Devoe: 26XX Velour Alkyd Semigloss Enamel.
Glidden: 4200 Spred Ultra Semigloss Enamel.
Moore: Moore's Satin Impervo Enamel #235.
Pittsburgh: 27 Line Wallhide Semigloss Enamel.
P & L: Cellu-Tone Alkyd Satin Enamel.
S-W: Classic 99 Semigloss Enamel A40 Series.

Exterior alkyd gloss enamel for use over a primer and undercoat on interior plaster surfaces, wood, and hardboard and ferrous and zinc-coated metal surfaces:

Porter: 4110 Glyptex Gloss Enamel.
Devoe: 70XX Mirrolac Interior/Exterior Alkyd Gloss Enamel.
Glidden: 4500 Glid-Guard Industrial Enamel.
Moore: Impervo High-Gloss Enamel #133.
Pittsburgh: 54 Line Quick-Dry Enamel.
P & L: Effecto Enamel.
S-W: Industrial Enamel B-54 Series.

PART 3 - EXECUTION

EXAMINATION

Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.

Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

PREPARATION

General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.

Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.

Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

Use abrasive blast-cleaning methods if recommended by the paint manufacturer.

Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

Ferrous Metals: Clean nongalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.

Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

Galvanized Surfaces: Clean galvanized surfaces with non- petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.

Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

Use only thinners approved by the paint manufacturer, and only within recommended limits.

APPLICATION

Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

Paint colors, surface treatments, and finishes are indicated in "schedules."

Provide finish coats that are compatible with primers used.

The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.

Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.

Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.

Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

Finish exterior doors on tops, bottoms, and side edges same as exterior faces.

Sand lightly between each succeeding enamel or varnish coat.

Omit primer on metal surfaces that have been shop-primed and touch up painted.

Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces.

Mechanical items to be painted include but are not limited to:

Piping, pipe hangers, and supports.
Heat exchangers.
Tanks.

Ductwork.
Insulation.
Supports.
Motors and mechanical equipment.
Accessory items.

Electrical items to be painted include but are not limited to:

Swtich gear.

Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

FIELD QUALITY CONTROL

The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

The Owner will engage the services of an independent testing laboratory to sample the paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

The testing laboratory will perform appropriate tests for the following characteristics as required by the Owner:

Quantitative materials analysis.
Abrasion resistance.
Apparent reflectivity.
Flexibility.
Washability.
Absorption.
Accelerated weathering.
Dry opacity.
Accelerated yellowness.
Recoating.
Skinning.
Color retention.
Alkali and mildew resistance.

If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing, repaint surfaces coated with rejected

paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are noncompatible.

CLEANING

Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

PROTECTION

Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

EXTERIOR PAINT SCHEDULE

General: Provide the following paint systems for the various substrates indicated (coordinate locations with architect).

Concrete, Stucco, and Masonry (Other than concrete masonry units):

Lusterless (Flat) Acrylic Finish: 2 coats with total dry film thickness not less than 2.5 mils.

First Coat: Exterior Acrylic Emulsion
Second Coat: Exterior Acrylic Emulsion

Concrete Masonry Units:

Lusterless (Flat) Acrylic Finish: 2 coats over block filler with total dry film thickness not less than 2.5 mils, excluding the block filler.

Block Filler: High-Performance Latex Block Filler.
First Coat: Exterior Acrylic Emulsion
Second Coat: Exterior Acrylic Emulsion

Mineral-Fiber-Reinforced Cement Panels:

Ferrous Metal: Primer is not required on shop-primed items.

Deep Color, High-Gloss Alkyd Trim Enamel: Two coats over primer.

Primer: Alkyd-Type Zinc Chromate Primer.
First Coat: Deep Color Alkyd Resin Exterior Trim Paint.
Second Coat: Deep Color Alkyd Resin Exterior Trim Paint.

Zinc-Coated Metal:

High-Gloss Alkyd Enamel: 2 finish coats over primer.

Primer: Galvanized Metal Primer.
First Coat: Alkyd Gloss Enamel.
Second Coat: Alkyd Gloss Enamel.

INTERIOR PAINT SCHEDULE

General: Provide the following paint systems for the various substrates, as indicated.

Concrete and Masonry (Other than concrete masonry units) Gypsum Board:

Semigloss Enamel Finish: 3 coats with total dry film thickness not less than 3.5 mils.

Primer: Latex-Based Interior Flat Paint.
Undercoat: Interior Semigloss Odorless Alkyd Emamel.
Finish Coat: Interior Semigloss Odorless Alkyd Enamel.

Concrete Masonry Units:

Semigloss Alkyd Enamel Finish: 2 coats over filled surface with total dry film thickness not less than 3.5 mils, excluding filler coat.

Block Filler: High-Performance Latex Block Filler.
Undercoat: Interior Enamel Undercoat.
Finish Coat: Interior Semigloss Odorless Alkyd Enamel.

Ferrous Metal:

Full-Gloss Enamel Finish: 2 coats over primer with total dry film thickness not less than 2.5 mils.

Primer: Synthetic Rust-Inhibiting Primer.
Undercoat: Interior Enamel Undercoat.
Finish Coat: Exterior Alkyd Gloss Enamel.

Zinc-Coated Metal:

Full-Gloss Enamel Finish: 2 coats over primer with total dry film thickness not less than 2.5 mils.
Primer: Galvanized Metal Primer.
Undercoat: Interior Enamel Undercoat.
Finish Coat: Exterior Alkyd Gloss Enamel.

END OF SECTION 09900

SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes toilet compartments, countertops, benches and screens as follows:

Compartment Type: Solid-plastic.

Compartment Style: Floor anchored.

Screen Style: Wall mounted.

Related Sections include the following:

Division 5 Section "Metal Fabrications" for supports that attach units to overhead structural system.

Division 10 "Toilet and Bath Accessories" for toilet paper holders, grab bars, purse shelves, and similar accessories.

SUBMITTALS

Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.

Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

Samples for Initial Selection: Manufacturer's color charts consisting of sections of actual units showing the full range of colors, textures, and patterns available for each type of compartment or screen indicated.

Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch- (150-mm-) square Samples of same thickness and material indicated for Work.

PROJECT CONDITIONS

Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Bobrick Washroom Equipment, Inc.
Santana Products, Inc.

MATERIALS

General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

Solid-Plastic, Panels: Solid plastic with colors that extend throughout the surface. Provide units with eased edges and with minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels and screens. Provide manufacture standard colors.

Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

For solid-plastic, in lieu of stainless-steel pilaster shoes and sleeves, manufacturer's standard plastic pilaster shoes and sleeves may be provided.

Stirrup Brackets: Manufacturer's standard ear or U-brackets for attaching panels and screens to walls and pilasters of the following material:

Material: Stainless steel.

Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:

Material: Stainless steel. Comply with ADA requirements.

Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:

Material: Stainless steel.

Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile in manufacturer's standard finish.

Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.

Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications.

For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

FABRICATION

General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.

Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab bars, as indicated.

Solid-Plastic, Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

Provide manufacturer's standard 4-inch- (100-mm-) high, overhead cross bracing.

Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.

Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.

Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.

Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.

Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.

Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

STAINLESS-STEEL SHEET FINISHES

General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

Remove or blend tool and die marks and stretch lines into finish.

Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

Finish: No. 3 directional polish.

When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

PART 3 - EXECUTION

INSTALLATION

General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.

Secure panels to walls and panels with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

Floor-Anchored Compartments: Set pilaster units with anchors penetrating not less than 2 inches (50 mm) into structural floor, unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

ADJUSTING AND CLEANING

Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10155

SECTION 10200 - LOUVERS AND VENTS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Fixed, extruded-aluminum louvers.

Fixed, formed-metal louvers.

Related Sections include the following:

Division 7 Section "Joint Sealants" for sealants installed in perimeter joints between louver frames and adjoining construction.

DEFINITIONS

Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section, unless otherwise defined in this Section or in referenced standards.

Standard Free Area: Free area of a louver 48 inches (1220 mm) wide by 48 inches (1220 mm) high, identical to that provided.

Maximum Standard Airflow: Airflow at point of beginning water penetration through a louver 48 inches (1220 mm) wide by 48 inches (1220 mm) high, identical to that provided.

Drainable-Blade Louver: Louver designed to collect and drain water to exterior at sill by means of gutters in front edges of blades and channels in jambs and mullions.

PERFORMANCE REQUIREMENTS

Structural Performance: Provide exterior metal louvers capable of withstanding the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of louver components including blades, frames, and supports; noise or metal fatigue caused by louver blade rattle or flutter; or permanent damage to fasteners and anchors.

Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward or outward.

Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, and other detrimental effects:

Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

Air-Performance, Water-Penetration, and Air-Leakage Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units 48 inches (1220 mm) wide by 48 inches

(1220 mm) high. Test units according to AMCA 500.

Perform testing on unpainted, cleaned, degreased units.

Perform water-penetration testing on louvers without screens.

Airborne Sound Transmission Loss: Provide acoustical louvers complying with airborne sound transmission loss ratings indicated, as demonstrated by testing manufacturer's stock units according to ASTM E 90.

SUBMITTALS

Product Data: For each type of product specified.

Shop Drawings: For louver units and accessories. Include plans; elevations; sections; and details showing profiles, angles, and spacing of louver blades. Show unit dimensions related to wall openings and construction; free area for each size indicated; profiles of frames at jambs, heads, and sills; and anchorage details and locations.

For installed louvers and vents indicated to comply with design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Wiring Diagrams: Detail power, signal, and control systems for motorized adjustable louvers and differentiate between manufacturer-installed and field-installed wiring.

Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

Samples for Verification: Of each type of metal finish required, prepared on Samples of same thickness and material indicated for final Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

Product Certificates: Signed by manufacturers of louvers certifying that the products furnished comply with requirements and are licensed to bear the AMCA seal based on tests made according to AMCA 500 and complying with AMCA's Certified Ratings Program.

Product Test Reports: Indicate compliance of products with requirements based on comprehensive testing of current products.

Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

QUALITY ASSURANCE

Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of louvers that are similar to those indicated for this Project in material, design, and extent.

Source Limitations: Obtain louvers and vents through one source from a single manufacturer where alike in one or more respects regarding type, design, or factory-applied color finish.

Welding Standards: As follows:

Comply with AWS D1.2, "Structural Welding Code--Aluminum."

Comply with AWS D1.3, "Structural Welding Code--Sheet Steel."

Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

SMACNA Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" recommendations for fabrication, construction details, and installation procedures.

UL and NEMA Compliance: Provide motors and related components for motor-operated adjustable louvers that are listed and labeled by UL and comply with applicable NEMA standards.

PROJECT CONDITIONS

Field Measurements: Verify louver openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Airline Products Co.
Airolite Co.

Color: As selected from standard range of colors.

MATERIALS

Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.

Fasteners: Of same basic metal and alloy as fastened metal or 300 series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.

Use types and sizes to suit unit installation conditions.

Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.

Anchors and Inserts: Of type, size, and material required for loading and installation indicated. Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as needed for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

FABRICATION, GENERAL

Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

Continuous Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates and without interrupting blade-spacing pattern.

Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

Maintain equal louver blade spacing to produce uniform appearance.

Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining materials' tolerances, and perimeter sealant joints.

Frame Type: Exterior flange, unless otherwise indicated.

Include supports, anchorages, and accessories required for complete assembly.

Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less. At horizontal joints between louver units, provide horizontal mullions, unless continuous vertical assemblies are indicated.

Provide sill extensions and loose sills made of same material as louvers where indicated or required for drainage to exterior and to prevent water penetrating to interior.

Join frame members to one another and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

Join frame members to one another and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view; unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

FIXED, EXTRUDED-ALUMINUM LOUVERS

Louver Construction: Provide fixed-blade louvers with extruded-aluminum frames and blades.

Similar to Airline XWD4-45

Horizontal, Drainable-Blade Louvers: As follows:

Louver Depth: 4 inches (125 mm).

Frame Thickness: 0.081 inch (2.06 mm).

Blade Thickness: 0.081 inch (2.06 mm).

Performance Requirements: Maximum standard airflow not less than 7000 cfm (3300 L/s) with not more than 0.20- inch wg (50-Pa) static-pressure loss.

Blade Profile: Drainge.

Blade Spacing: 4 inches (50 mm) o.c.

Blade Angle and Spacing: 45 degrees and 4 inches (75 mm) o.c. for 2-inch- (50-mm-) deep louvers.

Continuous, Horizontal, Drainable-Blade Louvers: Fabricated with close-fitting, field-made splice joints in blades designed to permit expansion and contraction without deforming blades or framework and with mullions recessed from front edges of blades so blades have continuous appearance.

LOUVER SCREENS

General: Provide each exterior louver with louver screens complying with the following requirements:

Screen Location for Fixed Louvers: Interior face.

Screening Type: Insect screening where indicated.

Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

Louver Screening for Aluminum Louvers: As follows:

Insect Screening: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm) wire.

FINISHES, GENERAL

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

Finish louvers after assembly.

ALUMINUM FINISHES

Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.

High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.

PART 3 - EXECUTION

PREPARATION

Coordinate Setting Drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

INSTALLATION

Locate and place louver units level, plumb, and at indicated alignment with adjacent work.

Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

Form closely fitted joints with exposed connections accurately located and secured.

Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

ADJUSTING, CLEANING, AND PROTECTING

Test operation of adjustable louvers and adjust as needed to produce fully functioning units that comply with requirements.

Periodically clean exposed surfaces of louvers and vents that are not protected by temporary covering to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

Protect louvers and vents from damage during construction. Use temporary protective coverings where needed and approved by louver manufacturer. Remove protective covering at the time of Substantial Completion.

Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

Clean and touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 10200

SECTION 10350 - FLAGPOLES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Aluminum flagpoles.

Related Sections include the following:

Division 3 Section "Cast-in-Place Concrete" for concrete footings for flagpoles, if any, and if not specified in this Section.

Division 7 Section "Sheet Metal Flashing and Trim" for flashing at roof-mounted flagpoles.

Division 7 Section "Joint Sealants" for elastomeric sealant filling the top of the foundation tube, if any.

PERFORMANCE REQUIREMENTS

Structural Performance: Provide flagpoles capable of withstanding the effects of wind loads as determined according to the building code in effect for this Project or NAAMM FP 1001, "Guide Specifications for Design Loads of Metal Flagpoles," whichever is more stringent.

Base flagpole design on maximum standard-size flag suitable for use with pole or flag size indicated, whichever is more stringent.

Basic Wind Speed: For Project location, 151 mph (50 m/s).

SUBMITTALS

Product Data: For each type of flagpole required. Include installation instructions.

Shop Drawings: Show general layout, jointing, grounding method, and anchoring and supporting systems.

Include details of foundation system for ground-set poles.

Structural Calculations: For flagpoles indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Finish Samples for Verification: For each finished metal used for flagpoles and accessories.

QUALITY ASSURANCE

Source Limitations: Obtain each flagpole as a complete unit from a single manufacturer, including fittings, accessories, bases, and anchorage devices.

DELIVERY, STORAGE, AND HANDLING

General: Spiral wrap flagpoles with heavy kraft paper or other weathertight wrapping and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Concord Industries, Inc.
Ewing: John Ewing & Co. Inc.
Kearney-National Inc.; American Flagpole Div.
Olympus Flag & Banner; EMC Div.
Pole-Tech Co., Inc.

FLAGPOLES

Pole Construction, General: Construct poles and ship to Project site in one piece, if possible. If more than one piece is necessary, provide snug-fitting precision joints with self-aligning, internal splicing sleeve arrangement for weathertight, hairline field joints.

Aluminum Flagpoles: Fabricate from seamless, extruded tubing complying with ASTM B 241 (ASTM B 241M), alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm). Heat treat after fabrication to comply with ASTM B 597, temper T6.

Provide cone-tapered aluminum flagpoles.

Foundation Tube: Galvanized corrugated-steel foundation tube, 0.0635-inch (1.6-mm) minimum wall thickness, sized to suit flagpole and installation. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges all welded together. Galvanize steel parts, including foundation tube, after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

Provide flashing collar of same material and finish as flagpole.

Provide ground spike at pavement-mounted flagpoles.

Pivoting Base: Steel baseplate with channel or rectangular tube uprights, pivot, and locking device. Provide flagpole with steel counterweight box and weights or with internal counterweight. Provide base with anchor bolts.

Finish base to match flagpole.

Provide ground spike at pavement-mounted flagpoles.

FITTINGS

Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match pole-butt diameter.

0.063-inch (1.6-mm) spun aluminum, finished to match flagpole.

External Halyard: Ball-bearing, nonfouling, revolving truck assemblies of cast metal with continuous 5/16-inch- (8-mm-) diameter, braided polypropylene halyards and 9-inch (225-mm) cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

Provide one halyard and one cleat at each flagpole.

Provide with neoprene or vinyl covers.

MISCELLANEOUS MATERIALS

Concrete: Comply with requirements of Division 3 Section "Cast-in-Place Concrete."

Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

Elastomeric Sealant: Comply with requirements of Division 7 Section "Joint Sealants."

FINISHES

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

Aluminum: Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.

PART 3 - EXECUTION

PREPARATION

Prepare in-ground flagpoles by painting below-grade portions with a heavy coat of bituminous paint.

Excavation: For foundation, excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete.

Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure forms, foundation tube, fiberglass sleeve, or anchor bolts in position, braced to prevent displacement during concreting.

Place concrete immediately after mixing. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than 7 days or use a nonstaining curing compound.

Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to base perimeter.

FLAGPOLE INSTALLATION

General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

Foundation-Tube Installation: Install flagpole in foundation tube, seated on bottom plate between steel centering wedges. Plumb flagpole and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric sealant and cover with flashing collar.

Baseplate Installation: Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION 10350

SECTION 10425 - SIGNS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following types of signs:

Panel signs. For typical rooms, ADA compliant.

Panel signs for H/C restroom and facility.

Related Sections: The following Sections contain requirements that relate to this Section:

SUBMITTALS

General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.

Provide message list for each sign required, including large-scale details of wording and lettering layout.

For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.

Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

QUALITY ASSURANCE

Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

Single-Source Responsibility: For sign type required, obtain signs from one source of a single manufacturer.

PROJECT CONDITIONS

Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Manufacturers of Panel Signs:

Masterwork Studios
APCO Graphics, Inc.
Mohawk Sign Systems.

MATERIALS

Plastic Laminate: Provide high-pressure plastic laminate engraving stock with face and core plies in contrasting colors, in finishes and color combinations indicated or, if not indicated, as selected from the manufacturer's standards.

Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.

PANEL SIGNS

Tactile Signs: Provide message having raised 1/32" high figures. Solid color acrylic plastic 025 inch thick with ½" radius corners; raised letters with contrasting color. Characters formed to Helvetica style.

All ADA compliant signs to be equivalent to Romark Ultra Matte laminated to ¼" styrene substrate with ½" radius corners. Colors as selected. All ADA signs to have 1/32" raised tactile text and Grade II Braille.

ADA Room Signs to have minimum 5/8" text. Room names to be taken from room finish schedule.

Handicap Restroom Signs, provide Pictograms to be men or women or unisex and provide at all universal handicap symbols as required.

PART 3 - EXECUTION

INSTALLATION

General: Locate sign units and accessories at ADA height requirements and on latch side of doors or as directed by Architect, using methods of type described and in compliance with the manufacturer's instructions, unless otherwise indicated.

Install sign units level, plumb and at the height indicated with sign surfaces free from distortion or other defects of appearance.

Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:

Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

Shim Plate Mounting: Provide 1/8-inch-thick concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach the plate with fasteners and anchors suitable for secure attachment to the substrate. Attach panel sign units to the plate using the method specified above.

CLEANING AND PROTECTION

After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10425

SECTION 10520 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Portable fire extinguishers.

Fire-protection cabinets for the following:

Portable fire extinguishers.

Related Sections include the following:

Division 10 Section "Signs" for directional signage to out-of-sight fire extinguishers and cabinets.

SUBMITTALS

Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.

Fire Extinguishers: Include rating and classification.

Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

Show location of knockouts for hose valves.

Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of cabinet finish indicated.

Samples for Verification: For each type of exposed cabinet finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

Size: 6-by-6-inch- (150-by-150-mm-) square Samples.

QUALITY ASSURANCE

Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

Provide extinguishers listed and labeled by FM.

COORDINATION

Coordinate size of cabinets to ensure that type and capacity of fire extinguishers indicated and provided by Owner under separate Contract are accommodated.

Coordinate size of cabinets to ensure that type and capacity of hoses, hose valves, and hose racks indicated are accommodated.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Portable Fire Extinguishers:

Larsen's Manufacturing Company.

Fire-Protection Cabinets:

Larsen's Manufacturing Company.

Available Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Fire-Protection Cabinet Schedule at the end of Part 3.

MATERIALS

Cold-Rolled Steel Sheet: Carbon steel, complying with ASTM A 366/A 366M, commercial quality, stretcher leveled, temper rolled.

PORTABLE FIRE EXTINGUISHERS

General: Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.

Multipurpose Dry-Chemical Type: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, in enameled-steel container.

WET CHEMICAL TYPE (KITCHEN LOCATION): UL Rated K, 15-LB (6 liter) nominal capacity in stainess steel container.

FIRE-PROTECTION CABINETS

Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.

Fire-Rated Cabinets: Listed and labeled to meet requirements of ASTM E 814 for fire-resistance rating of wall where it is installed.

Construct fire-rated cabinets with double walls fabricated from 0.0478-inch- (1.2-mm-) thick, cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick, fire-barrier material.

Provide factory-drilled mounting holes.

Cabinet Metal: Stainless-steel sheet.

Shelf: Same metal and finish as cabinet.

Cabinet Type: Suitable for the following:

Fire extinguisher.

Cabinet Mounting: Suitable for the following mounting conditions:

Semirecessed: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated.

Cabinet Trim Style: Fabricate cabinet trim in one piece with corners rolled edge, welded, and ground smooth.

Cabinet Trim Material: Manufacturer's standard, as follows:

Steel sheet.

Door Material: Manufacturer's standard, as follows:

Stainless-steel sheet, 18 gauge thick.

Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.

Provide minimum 1/2-inch- (13-mm-) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.

Provide inside latch and lock for break-glass panels.

Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

ACCESSORIES

Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish.

Provide brackets for extinguishers mounted on wall.

Door Locks: Provide cylinder lock, with all cabinets keyed alike.

Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.

Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.

Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.

Application Process: Silk-screened.

Lettering Color: Red.

Orientation: Vertical.

COLORS AND TEXTURES

Colors and Textures: As selected by Architect from manufacturer's full range for these characteristics.

FINISHES, GENERAL

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Cabinet and Door Finishes: Provide manufacturer's standard baked-enamel paint for the following:

Exterior of cabinets and doors, except for those surfaces indicated to receive another finish.

Interior of cabinets and doors.

STEEL FINISHES

Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.

Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.

Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

STAINLESS-STEEL FINISHES

General: Remove or blend tool and die marks and stretch lines into finish. Grind and polish surfaces to produce uniform, directionally textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

Bright, Directional Polish: No. 4 finish.

Satin, Directional Polish: No. 6 finish.

PART 3 - EXECUTION

EXAMINATION

Examine roughing-in for hose valves, hose racks, and cabinets to verify actual locations of piping connections before cabinet installation.

Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets are to be installed.

Examine fire extinguishers for proper charging and tagging.

Remove and replace damaged, defective, or undercharged units.

Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION

Comply with manufacturer's written instructions for installing fire-protection specialties.

Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

Prepare recesses for cabinets as required by type and size of cabinet and trim style.

Fasten mounting brackets to structure and cabinets, square and plumb.

Fasten cabinets to structure, square and plumb.

ADJUSTING, CLEANING, AND PROTECTION

Adjust cabinet doors that do not swing or operate freely.

Refinish or replace cabinets and doors damaged during installation.

Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

FIRE-PROTECTION CABINET SCHEDULE

Fire-Protection Cabinet: Where this designation is indicated, provide fire-protection cabinet complying with the following:

Products: Larsen “Cameo” SS-SF C2409-5R

Construction: Nonrated and 1-hour fire rated where located in rated wall construction

Cabinet Material: Stainless-steel sheet

Type: Fire extinguisher

Mounting: Semirecessed

END OF SECTION 10520

SECTION 10801 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Toilet and bath accessories.

Related Sections include the following:

Division 10 Section "Toilet Partitions" for compartments and screens.

SUBMITTALS

Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

Samples: For each accessory item to verify design, operation, and finish requirements.

Approved full-size Samples will be returned and may be used in the Work.

Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.

Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

QUALITY ASSURANCE

Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.

Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.

Products of other manufacturers with equal characteristics, as judged solely by Architect, may be provided.

Products of other manufacturers listed in Part 2 with equal characteristics, as judged solely by Architect, may be provided.

Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Substitutions."

Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

COORDINATION

Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

WARRANTY

General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

Toilet and Bath Accessories:

American Specialties, Inc.
Bobrick Washroom Equipment, Inc.
Bradley Corporation.

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Toilet and Bath Accessory Schedule at the end of Part 3.

Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Toilet and Bath Accessory Schedule at the end of Part 3.

MATERIALS

Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

FABRICATION

General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

Provide galvanized steel backing sheet, not less than 0.034 inch (0.85 mm) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

PART 3 - EXECUTION

INSTALLATION

Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

ADJUSTING AND CLEANING

Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

Remove temporary labels and protective coatings.

Clean and polish exposed surfaces according to manufacturer's written recommendations.

TOILET AND BATH ACCESSORY SCHEDULE

Refer to Schedule Sheet.
END OF SECTION 10801

SECTION 11400 - FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes food service equipment stainless countertops, shelves, range and miscellaneous items as indicated on Drawings and schedules.

Owner-Furnished Equipment: Where indicated, Owner will furnish equipment items.

Related Sections include the following:

Refer to Division 15 Sections for supply and exhaust fans; exhaust ductwork; service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; fire-extinguishing systems; and other materials required to complete food service equipment installation.

Refer to Division 16 Sections for connections to fire alarm systems, wiring, disconnects, and other electrical materials required to complete food service equipment installation.

DEFINITIONS

Terminology Standard: Refer to NSF 2, "Food Equipment" or other applicable NSF standards for definitions of food service equipment and installation terms not otherwise defined in this Section or in other referenced standards.

SUBMITTALS

Product Data: For each type of food service equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel, and service-connections including roughing-in dimensions.

Shop Drawings: For food service equipment not manufactured as standard production and catalog items by manufacturers. Include plans, elevations, sections, roughing-in dimensions, fabrication details, service requirements, and attachments to other work.

Wiring Diagrams: Details of wiring for power, signal, and control systems and differentiating between manufacturer-installed and field-installed wiring.

Piping Diagrams: Details of piping systems and differentiating between manufacturer-installed and field-installed piping.

Coordination Drawings: For locations of food service equipment and service utilities. Key equipment with item numbers and descriptions indicated in Contract Documents. Include plans and elevations of equipment, access- and maintenance-clearance requirements, details of concrete or masonry bases and floor depressions, and service-utility characteristics.

Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for exposed products with color finishes.

Samples for Verification: Of each type of exposed finish required, minimum 4-inch- (100-mm-) square or 6-inch- (150-mm-) long sections of linear shapes and of same thickness and material indicated for work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

Product Certificates: Signed by manufacturers of refrigeration systems or their authorized agents certifying that systems furnished comply with requirements and will maintain operating temperatures indicated in the areas or equipment that they will serve.

Maintenance Data: Operation, maintenance, and parts data for food service equipment to include in the maintenance manuals specified in Division 1. Include a product schedule as follows:

Product Schedule: For each food service equipment item, include item number and description indicated in Contract Documents, manufacturer's name and model number, and authorized service agencies' addresses and telephone numbers.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing food service equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in-service performance.

Manufacturer Qualifications: Engage a firm experienced in manufacturing food service equipment similar to that indicated for this Project and with a record of successful in-service performance.

Source Limitations: Obtain each type of food service equipment through one source from a single manufacturer.

Product Options: Drawings indicate food service equipment based on the specific products indicated. Other manufacturers' equipment with equal size and performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

Regulatory Requirements: Comply with the following National Fire Protection Association (NFPA) codes:

NFPA 54, "National Fuel Gas Code."

NFPA 70, "National Electrical Code."

NSF Standards: Comply with applicable NSF International (NSF) standards and criteria and provide NSF Certification Mark on each equipment item, unless otherwise indicated.
ANSI Standards: Comply with applicable ANSI standards for electric-powered and gas-burning appliances; for piping to compressed-gas cylinders; and for plumbing fittings, including vacuum breakers and air gaps, to prevent siphonage in water piping.

SMACNA Standard: Where applicable, fabricate food service equipment to comply with the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Kitchen Equipment Fabrication Guidelines," unless otherwise indicated.

Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

DELIVERY, STORAGE, AND HANDLING

Deliver food service equipment as factory-assembled units with protective crating and covering.

Store food service equipment in original protective crating and covering and in a dry location.

PROJECT CONDITIONS

Field Measurements: Verify dimensions of food service equipment installation areas by field measurements before equipment fabrication and indicate measurements on Shop Drawings and Coordination Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Established Dimensions: Where field measurements cannot be made without delaying the Work, establish required dimensions and proceed with fabricating equipment without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

COORDINATION

Coordinate equipment layout and installation with other work, including light fixtures, HVAC equipment, and fire-suppression system components.

Coordinate location and requirements of service-utility connections.

Coordinate size, location, and requirements of concrete bases, positive slopes to drains, floor depressions, and insulated floors. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

WARRANTY

General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

MATERIALS

Stainless-Steel Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304, stretcher leveled, and in finish specified in "Stainless-Steel Finishes" Article.

Stainless-Steel Tube: ASTM A 554, Grade MT-304, and in finish specified in "Stainless-Steel Finishes" Article.

Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds.

ACCESSORIES

Cabinet Hardware: Provide NSF-certified, stainless-steel hardware for equipment items as indicated.

Casters: NSF-certified, standard-duty, stainless-steel, swivel stem casters with 5-inch- (125-mm-) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width, and 200-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit. For baker's table only.

FABRICATION, GENERAL

Fabricate food service equipment according to NSF 2 requirements. Factory assemble equipment to greatest extent possible.

Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Provide ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.

Welded Butt Joints: Provide full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.

Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.

Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and undepressed.

Coat unexposed stainless-steel welded joints with suitable metallic-based paint to prevent corrosion.
Fabricate field-assembled equipment prepared for field-joining methods indicated. For metal butt joints, comply with referenced SMACNA standard, unless otherwise indicated.

Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.

Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.

Provide surfaces in food zone, as defined in NSF 2, free from exposed fasteners.

Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

Provide pipe slots on equipment with turned-up edges and sized to accommodate service and utility lines and mechanical connections.

Provide enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.

STAINLESS-STEEL EQUIPMENT

Edges and Backsplashes: Provide equipment edges and backsplashes indicated complying with referenced SMACNA standard, unless otherwise indicated.

Apply sound dampening to underside of metal work surfaces, including sinks and similar units. Provide coating with smooth surface and hold coating 1 inch (25 mm) back from open edges for cleaning.

Tables: Fabricate with reinforced tops, legs, and reinforced undershelves or cross bracing to comply with referenced SMACNA standard, unless otherwise indicated, and as follows:

Tops: Minimum 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.

Legs: 1-5/8 inch (41.3 mm) OD, minimum 0.0625-inch- (1.588-mm-) thick stainless steel with stainless-steel gusset and adjustable insert bullet-type feet with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.

Undershelves: Minimum 0.625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

Top and Undershelf Reinforcement: Provide minimum 0.0781-inch- (1.984-mm-) thick, stainless-steel reinforcing, unless otherwise indicated.

Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

Sinks: Fabricate of minimum 0.0781-inch- (1.984-mm-) thick stainless steel with fully welded, 1-piece construction. Construct 2 sides and bottom of sink compartment from 1 stainless-steel sheet with ends welded integral and without overlapping joints or open spaces between compartments. Provide double-wall partitions between compartments with 1/2-inch- (13-mm-) radius rounded tops that are welded integral with sink body. Cove horizontal, vertical, and interior corners with 3/4-inch (19-mm) radius. Pitch and crease sinks to waste for drainage without pooling. Seat wastes in die-stamped depressions without solder, rivets, or welding. Provide simcs 12" deep minimum

Wastes: 2-inch (50-mm) nickel-plated bronze, rotary-handle waste assembly with stainless-steel strainer plate and nickel-plated brass, connected overflow.

Drainboards: Minimum 0.0781-inch- (1.984-mm-) thick stainless steel, pitched to sink at 1/8 inch/12 inches (3 mm/300 mm) of length. Reinforce drainboards with minimum 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.

Legs: 1-5/8 inch (41.3 mm) OD, minimum 0.0625-inch- (1.588-mm-) thick stainless steel with stainless-steel gusset welded to 0.1094-inch- (2.779-mm-) thick, stainless-steel support plate. Provide adjustable insert bullet-type feet with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.

Drainboard Braces: 1 inch (25 mm) OD, minimum 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

Wall Shelves and Overshelves: Fabricate to comply with referenced SMACNA standard, unless otherwise indicated, and with minimum 0.0625-inch- (1.588-mm-) thick, stainless-steel shelf tops.

Drawers: Provide lift-out type, 1-piece, die-stamped drawer pan fabricated from 0.050-inch (1.27-mm-) thick stainless steel with inside corners radiused. Supportdrawer pan with 0.0625-inch (1.588-mm-) thick, stainless steel channel from welded to drawer front. Provide1-inch (26-mm) thick, double-wall front fabricated from 0.0625-inch (1.588-mm-) thick stainless steel and with integral recessed pull. fill void in drawer front with semi-rigid fiberglass sound dampening. Mount drawers on NSF-certified, full-extension, stainless steel drawer sides that have minimum 100-lb (45-kg) load capacity per pair, ball-bearing rollers, and positive stop. Mount drawer slides for self-closing on drawer housing as indicated.

STAINLESS-STEEL FINISHES

General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

Remove or blend tool and die marks and stretch lines into finish.

Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

Concealed Surfaces: No. 2B finish (bright, cold-rolled, unpolished finish).

Exposed Surfaces: No. 4 finish (bright, directional polish).

When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

PART 3 - EXECUTION

EXAMINATION

Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, service-utility connections, and other conditions affecting installation and performance of food service equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

Examine roughing-in for piping, mechanical, and electrical systems to verify actual locations of connections before installation.

INSTALLATION, GENERAL

Install food service equipment level and plumb, according to manufacturer's written instructions, original design, and referenced standards.

Complete equipment field assembly, where required, using methods indicated.

Provide closed butt and contact joints that do not require a filler.

Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in "Fabrication, General" Article.

Install equipment with access and maintenance clearances according to manufacturer's written instructions and requirements of authorities having jurisdiction.

Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

Except for mobile and adjustable-leg equipment, securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.

Install seismic restraints according to referenced SMACNA standard.

Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches (1200 mm) o.c. maximum.

Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.

PROTECTING

Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.

COMMISSIONING

Startup Services: Engage factory-authorized service representatives to perform startup services and to demonstrate and train Owner's maintenance personnel as specified below.

Coordinate food service equipment startup with service-utility testing, balancing, and adjustments. Do not operate steam lines before they have been cleaned and sanitized.

Remove protective coverings and clean and sanitize equipment, both inside and out, and relamp equipment with integral lighting. Where applicable, comply with manufacturer's written cleaning instructions.

Test each equipment item for proper operation. Repair or replace equipment that is defective in operation, including units that operate below required capacity or that operate with excessive noise or vibration.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

Test water, drain, gas, steam, oil, refrigerant, and liquid-carrying components for leaks. Repair or replace leaking components.

Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance for each food service equipment item.

Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout."

Review data in the operation and maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."

Schedule training with Owner, through Architect, with at least 7 days' advance notice.
FOOD SERVICE EQUIPMENT SCHEDULE

Compartment Sink: Where items of this designation are indicated, provide products complying with the following:

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

Similar advance TABCO, 2 compartment ADV93-22-40-18RL-X with 12" deep compartments minimum.

Gas Range: Where items of this designation are indicated, provide products complying with the following:

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

Vulcan – G60SC-6FT24 with 6 open burners, 24" griddle with 2 standard ovens.

Baker's Work Table: Where items of this designation are indicated, provide products complying with the following:

Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

Table:	Advance TABCO	MS-305 30" x 60"
Shelving:	Advance TABCO	ADVPT-10-60
Pot Racks:	Advance TABCO	ADVSCT-60
Utinsel Rack:	Advance TABCO	ADVAUR-60

END OF SECTION 11400

SECTION 11451 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes the following:

Refrigerator/freezers.

SUBMITTALS

Product Data: For each appliance type required indicating compliance with requirements. Include complete operating and maintenance instructions for each appliance.

Appliance Schedule: Submit schedule of appliances, using the same room designations shown on Drawings.

QUALITY ASSURANCE

Installer Qualifications: An experienced installer who is an authorized representative of the residential appliance manufacturer for both installation and maintenance of appliances required for this Project.

Source Limitations: Obtain residential appliances through one source from a single manufacturer.

Provide products from the same manufacturer for each type of appliance required.

To the greatest extent possible, provide appliances by a single manufacturer for entire Project.

Product Options: Drawings indicate sizes, profiles, and dimensional requirements of residential appliances and are based on the specific types and models indicated. Other manufacturers' appliances with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

Electrical Appliances: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

UL and NEMA Compliance: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.

AGA and ANSI Standards: Provide gas-burning appliances that carry the design certification seal of AGA and that comply with ANSI Z21-Series standards.

AHAM Standards: Provide appliances that comply with the following AHAM standards:

Refrigerators and Freezers: Total volume and shelf area ratings certified according to ANSI/AHAM HRF-1.

Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating costs) and efficiency information as required by the Federal Trade Commission.

DELIVERY

Deliver appliances only after utility rough-in is complete and construction in the spaces to receive appliances is substantially complete and ready for installation.

WARRANTIES

General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

Special Warranties: Written warranties, executed by manufacturer of each appliance specified agreeing to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

Refrigerator/Freezer: Five-year limited warranty on the sealed refrigeration system.

Electric Ranges: Five-year limited warranty on the sealed refrigeration system.

PART 2 - PRODUCTS

PRODUCTS AND MANUFACTURERS

Available Products: Subject to compliance with requirements, appliances that may be incorporated into the Work include, but are not limited to, those indicated in the Residential Appliance Schedule at the end of Part 3.

Products: Subject to compliance with requirements, provide one of the appliances indicated for each designation in the Residential Appliance Schedule at the end of Part 3.

FINISHES

Porcelain-Enamel Finish: Provide manufacturer's standard factory-applied porcelain-enamel finish over cleaned and pretreated steel sheet.

Color and Gloss: As selected by Architect from manufacturer's full range.

Where residential appliances by more than one manufacturer are installed in the same space, provide units with color matching largest equipment item.

PART 3 - EXECUTION

EXAMINATION

Examine roughing-in for plumbing, mechanical, and electrical services, with Installer present, to verify actual locations of services before residential appliance installation.

Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION

General: Comply with manufacturer's written instructions.

Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.

Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

Utilities: Refer to Divisions 15 and 16 for plumbing and electrical requirements.

ADJUSTING AND CLEANING

Test each item of residential appliances to verify proper operation. Make necessary adjustments.

Verify that accessories required have been furnished and installed.

Remove packing material from residential appliances and leave units in clean condition, ready for operation.

RESIDENTIAL APPLIANCE SCHEDULE

Side By Side Refrigerator: Where this designation is indicated, provide refrigerator/freezers complying with the following:

Products: GE Profile Series GSHF5KGXWW.

Type: Freestanding, frost-free, two-door, side freezer refrigerator/freezer with polystyrene ABS thermoplastic-copolymer interior cabinet liners and ice/water dispenser.

Refrigerator Storage Capacity: 25.4 cubic feet total interior refrigerator volume measured according to ANSI/AHAM HRF-1 and certified by AHAM.

Finish: Porcelain enamel on steel.

Color: High-Gloss White.

Standard features include the following:

Interior light in fresh food compartment.
Adjustable rollers.

Adjustable compartment shelves.

Optional features include the following:

Spill-proof shelves.

Interior light in freezer compartment.

Ice Machine:

Apparatus Floor Floor Mounted: Scotsman C0330 w/B330P ice bin.

Kitchen Undercounter: Scotsman CU0515
www.scotsman-ice.com

Clothes Washer Extractor: Where this designation is indicated, provide clothes washers complying with the following:

Speed Queen SCN060; Silver OPL 9 cycle, 8 segment advance microprocessor control, stainless steel top and front. Alliance steel 6" high steel base

Type: Freestanding, front-loading, automatic clothes washer, operable at water pressures from 30 to 120 psi (200 to 825 kPa).

Finish: Manufacturer's Standard

Color: Stainless Steel

Electric Clothes Dryer: Where this designation is indicated, provide clothes dryers complying with the following:

GE Dryer DCVH680EJMS or equal.

Type: Freestanding, front loading.

Drum: Manufacturer Standard.

Finish: Porcelain enamel on steel.

Color White

Standard features include the following:

Timed cycle selection.
Fabric selector.
Cycle-end signal.
Safety starting control.
Removable lint filter.

Dishwasher:

GE PDWT580PSS or equal.
Type: Free standing, front loading
Color/Finish: Stainless steel

END OF SECTION 11451

SECTION 12511 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

SUMMARY

This Section includes venetian blinds.

Related Sections: The following Sections contain requirements that relate to this Section:

Division 8 Sections for windows with horizontal louver blinds mounted in window frames.

SUBMITTALS

General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

Product data for each type of horizontal louver blind specified. Include printed data on physical characteristics.

Shop drawings showing location and extent of blinds. Show installation details at and relationship to adjoining work. Include elevations indicating blind units. Indicate location of blind controls.

Samples for initial selection in the form of manufacturer's color charts showing the full range of colors, textures, and patterns available for each type of horizontal louver blind indicated.

Samples for verification of the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected. Prepare samples from the same material to be used for the Work.

Louver: Manufacturer's standard-size unit, not less than 12 inches (300 mm) long.

Valance: Manufacturer's standard-size unit, not less than 12 inches (300 mm) long.

Schedule of horizontal louver blinds using same room designations indicated on Drawings.

Maintenance data for horizontal louver blinds to include in the operation and maintenance manual specified in Division 1. Include the following:

Methods for maintaining horizontal louver blinds and finishes.

Precautions for cleaning materials and methods that could be detrimental to finishes and performance.

QUALITY ASSURANCE

Fire-Test-Response Characteristics: Provide horizontal louver blinds identical to those tested for the following fire-test-response characteristics as determined by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

Test Method: NFPA 701.

Rating: Pass.

Single-Source Responsibility: Obtain each type of horizontal louver blind from one source and by a single manufacturer.

PROJECT CONDITIONS

Field Measurements: Check actual horizontal louver blind dimensions by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

Space Enclosure and Environmental Limitations: Do not install horizontal louver blinds until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

EXTRA MATERIALS

Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

Horizontal Louver Blinds: Before installation begins, furnish quantity of full-size units equal to 5 percent of amount of each size installed.

PART 2 - PRODUCTS

MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:

Horizontal Louver Blinds:

Eastern Standard Corp.
Faber.
Hunter Douglas, Inc.
Joanna Western Mills Co.
Kirsch.
Levolor Corp.

Available Products: Subject to compliance with requirements, horizontal louver blinds that may be incorporated in the Work include, but are not limited to, the products specified in each Product Data sheet at the end of this Section.

HORIZONTAL LOUVER BLINDS

Louvers: Manufacturer's standard as follows:

Aluminum.

Nominal Louver Width: 1 inch (25 mm) (miniblinds).

Tilt Operation: Manual with wand.

Length of Tilt Control: Full length of blind.

Position of Tilt Control: Right side, unless otherwise indicated.

Tilt: Full.

Cord-Lock Operation: Cord lock; locks pull cord to stop blind at any position in ascending or descending travel.

Position of Cord Lock: Right side, unless otherwise indicated.

Cord Equalizers: Self-aligning to maintain horizontal louver blind position.

Valance: Match color of louvers.

Mounting: End or head within storefront unit.

Colors and Patterns: Where manufacturer's standard products are indicated, provide horizontal louvers complying with the following requirements:

Provide Architect's selections from manufacturer's full range of colors and patterns for horizontal louver blinds of type indicated.

FABRICATION

Product Standard and Description: Comply with AWCMA Document 1029 for each horizontal louver blind unit consisting of louvers, rails, cord locks, tilting mechanisms, tapes, and installation hardware.

Lifting and Tilting Mechanisms: Noncorrosive, self-lubricating materials.

Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):

Blind Units Installed Between (Inside) Jambs: Width equal to 1/4 inch (6 mm) per side or 1/2 inch (12 mm) total, plus or minus 1/8 inch (3 mm), less than jamb to jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch (6 mm), plus or minus 1/8 inch (3 mm), less than head to sill dimension of opening in which each blind is installed.

Blind Units Installed Outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

Installation Fasteners: Not less than 2 fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; support blind units under conditions of normal use.

Hold-Down Brackets: Manufacturer's standard, as indicated.

Side Channels: Manufacturer's standard, as indicated.

PART 3 - EXECUTION

EXAMINATION

Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of horizontal louver blinds. Do not proceed with installation until unsatisfactory conditions have been corrected.

INSTALLATION

Install blinds level, plumb, and located so exterior louver edges in any position are not closer than 1 inch (25 mm) to interior face of glass lites.

Flush Mounted: Install blinds with louver edges flush with finish face of wall.

ADJUSTING

Adjust components and accessories for proper operation.

CLEANING

Clean blind surfaces, according to manufacturer's instructions, after installation.

Remove surplus materials, packaging, rubbish, and debris resulting from installation. Leave installation areas neat, clean, and ready for use.

PROTECTION

Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensure that horizontal louver blinds are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 12511

SECTION 16011

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes short circuit and protective device coordination study encompassing portions of electrical distribution system from normal power source or sources up to and including breakers in service entrance switchboard, fuses in service entrance switchboard, main breaker in sub-distribution panels, fuses in sub-distribution panels and main breaker in each panelboard].

B. Related Sections:
1. Section 16123 - Building Wire and Cable.
2. Section 16226 - Common Motor Requirements for Plumbing Equipment.
3. Section 16227 - Common Motor Requirements for HVAC Equipment.
4. Section 16235 - Engine Generators.
5. Section 16265 - Variable Frequency Controllers.
6. Section 16271 - Pad-Mounted Transformers.
7. Section 16411 - Enclosed Switches.
8. Section 16412 - Enclosed Circuit Breakers.
9. Section 16413 - Enclosed Transfer Switches.
10. Section 16423 - Enclosed Contactors.
11. Section 16442 - Panelboards.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:
1. IEEE 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).

B. National Fire Protection Association:
1. NFPA 70 - National Electrical Code.

1.3 DESIGN REQUIREMENTS

A. Complete Short Circuit and Protective Device Coordination Study to meet requirements of NFPA 70.

B. Report Preparation:
1. Prepare study prior to ordering distribution equipment to verify equipment ratings required.
2. Perform study with aid of computer software program.
3. Obtain actual settings for packaged chiller motor characteristics and other equipment incorporated into Work.

4. Calculate short circuit interrupting and, when applicable, momentary duties for assumed 3-phase bolted fault short circuit current and phase to ground fault short circuit current at each of the following:
a. Utility supply bus.
b. Automatic transfer switch.

c. Manual transfer switch.
d. Engine generator.
e. Distribution panelboards.
f. Branch circuit panelboards.
g. Each other significant equipment location throughout system.

C. Report Contents:
1. Include the following:
a. Calculation methods and assumptions.
b. Base per unit value selected.
c. One-line diagram.
d. Source impedance data including power company system available power and characteristics.
e. Typical calculations.
1) Fault impedance.
2) X to R ratios.
3) Asymmetry factors.
4) Motor fault contribution.
5) Short circuit kVA.
6) Symmetrical and asymmetrical phase-to-phase and phase-to-ground fault currents.
7) Tabulations of calculation quantities and results.
f. One-line diagram revised by adding actual instantaneous short circuits available.
g. State conclusions and recommendations.
2. Prepare time-current device coordination curves graphically indicating coordination proposed for system, centered on conventional, full-size, log-log forms.
3. Prepare with each time-curve sheet complete title and one-line diagram with legend identifying specific portion of system covered by that particular curve sheet.
4. Prepare detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.
5. Plot device characteristic curves at point reflecting maximum symmetrical fault current to which device is exposed. Include on curve sheets the following:
a. Power company relay characteristics.
b. Power company fuse characteristics.
c. Low voltage equipment circuit breaker trip device characteristics.
d. Low voltage equipment fuse characteristics.
e. Cable damage point characteristics.
f. Pertinent transformer characteristics including:
1) Transformer full load current.
2) Transformer magnetizing inrush.
3) ANSI transformer withstand parameters.
4) Significant symmetrical fault current.
g. Pertinent motor characteristics.
h. Generator characteristics including:
1) Phase and ground coordination of generator protective devices.
2) Decrement curve and damage curve.
3) Operating characteristic of protective devices.
4) Actual impedance value.

5) Time constants.
6) Current boost data.
7) Do not use typical values for generator.

i. Transfer switch characteristics.
j. Other system load protective device characteristics.

1.4 SUBMITTALS

A. Qualifications Data: Submit the following for review prior to starting study.
1. Submit qualifications and background of firm.

2. Submit qualifications of [Professional Engineer] performing study.

B. Software: Submit for review information on software proposed to be used in performing study.

C. Product Data: Submit the following:
1. Report: Summarize results of study in report format including the following:
a. Descriptions, purpose, basis, and scope of study.
b. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short-circuit duties, and commentary regarding same.
c. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
d. Fault current calculations including definition of terms and guide for interpretation of computer printout.

D. Submit copies of final report. Make additions or changes required by review comments.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with State of Florida.

B. Maintain one copy of each document on site.

C. Perform study in accordance with NFPA70.

1.6 QUALIFICATIONS

A. Study Preparer: Company specializing in performing work of this section [with minimum 10 years documented experience and having completed 5 projects of similar size and complexity within the past 5 years.

B. Perform study under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Florida with minimum of five years' experience in power system analysis.

C. Demonstrate company performing study has capability and experience to provide assistance during system start up.

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing work of this section.

1.8 SEQUENCING

A. Allow 10 days for review of completed study by Engineer.

B. Submit short circuit and protective device coordination study to Engineer prior to receiving final approval of distribution equipment shop drawings and prior to releasing equipment for manufacturing.

C. When formal completion of study will cause delay in equipment manufacturing, obtain approval from Engineer for preliminary submittal of study data sufficient in scope to ensure selection of device ratings and characteristics will be satisfactory.

1.9 SCHEDULING

A. Schedule work to expedite collection of data to ensure completion of study for final approval of distribution equipment shop drawings prior to release of equipment for manufacturing.

1.10 COORDINATION

A. Coordinate work with local power company.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Provide assistance to electrical distribution system equipment manufacturer during start up of electrical system and equipment.

B. Select each primary protective device for delta-wye connected transformer so device's characteristic or operating band is within transformer characteristics, including point equal to 58 percent of ANSI withstand point to provide secondary line-to-ground fault protection.

C. Separate transformer primary protective device characteristic curves from associated secondary device characteristics by 16 percent current margin to provide proper coordination and protection in event of secondary line-to-line faults.

D. Separate medium-voltage relay characteristic curves from curves for other devices by at least 0.4 second time margin.

3.2 ADJUSTING

A. Perform field adjustments of protective devices and modifications to equipment to place equipment in final operating condition. Adjust settings in accordance with approved short circuit and protective device coordination study.

END OF SECTION 16011

SECTION 16050

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Bidders of work in Sections under Division 16 are expected to have read the above requirements and, upon subcontracting for work called for in such Sections, shall be responsible for compliance with such Sections.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. All work under Division 16 shall comply with requirements of National Electrical Code, Florida Building Code, Life Safety Code, and to other pertinent codes made a part of such code by reference.

1.3 INTENT

A. It is the intention of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."

B. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

1.4 SURVEYS AND MEASUREMENTS

A. Base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work. All material take-offs for the site shall be field measured prior to bids.

1.5 DRAWINGS

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. Drawings are not to be scaled.

B. If directed by the Owner or Engineer, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

C. At the time of each shop drawing submission, the Contractor shall call the Engineer's attention (in writing) to, and plainly mark on shop drawings, any deviations from the Contract Documents.

1.6 REFERENCES

A. ANSI/NFPA 70—National Electrical Code.

B. Florida Building Code.

C. NFPA 101 - Life Safety Code.

D. Florida Fire Protection Code.

1.7 SUBSTITUTIONS

A. The intention of the terms of these Contract Documents is for the Contractor to furnish and the Owner to receive the exact materials and equipment specified in (a) the originally published Specifications and Drawings or, (b) as previously specified in any addendum issued by the Owner and Project Engineer (PE) during bidding and prior to bid opening.

B. Therefore, it is the intention of the Owner and Engineers to prohibit substitutions after the time of bid opening.

1.8 SUBMITTALS

A. Proposed Products List: Include Products specified in the following Sections, but not limited to:

1. Section 16129 Conduit and Raceways.
2. Section 16411 Disconnect Switches.
3. Section 16442 Panelboards.
4. Section 16289 Surge Protective Device.
5. Section 16430 Metering.
6. Section 16100 Building Wire & Cable.
7. Section 16060 Grounding and Bonding.
8. Section 16070 Supporting Devices.
9. Section 16075 Electrical Identification.
10. Section 16128 Boxes.
11. Section 16721 Fire Alarm System.
12. Section 16057 Overcurrent Protective Device Coordination Study.
13. Section 16510 Luminaires.
14. Section 16670 Lightning Protection System.

C. Submittals are required for all items of mechanical and electrical equipment and products provided by this Contractor. Refer to each Section for additional requirements.

D. Manufacturer's catalog cuts may be submitted for all standard cataloged equipment, provided that the item required to meet the Project Specifications is not modified in any way from the standard catalog version of said item.

E. Operating and maintenance manuals shall be provided in an organized manner. They should include instructions, wiring/control diagrams, spare parts list, warranties and test certificates. Any special tools or keys should also be included.

F. Test and Certifications:

1. Provide insulation resistance at ground continuity tests for all feeders, branch circuits, or other equipment.

a. In no case shall the insulation resistance be less than 50,000 ohms at 600 volts.

2. Written test results and certification shall be required for proper fire alarm operation from the installer of the fire alarm equipment.
3. Optimum phase balance under full load conditions shall be obtained. Special care shall be taken to prevent reverse rotation of motors during these adjustments.

1.9 COOPERATION WITH OTHER TRADES

A. Give full cooperation to other trades and furnish in writing to the General Contractor, with copies to the Owner and Engineer, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

1.10 PROTECTION

A. Protect all work and material provided under this Division from damage. All damaged equipment work or material provided under this Division shall be replaced with new. Rebuilts are not acceptable.

B. Protect all work and equipment until inspected, tested, and accepted. Protect work against theft, injury, or damage; and carefully store material and equipment received on site which are not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

1.11 SCAFFOLDING, RIGGING, AND HOISTING

A. Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

1.12 REMOVAL OF RUBBISH

A. This Contractor shall at all times keep premises free from accumulations of waste materials or rubbish caused by his employees or work. At completion of work he shall remove all his tools, scaffolding, materials, and rubbish from the building and site. He shall leave the premises and his work in a clean, orderly, and acceptable condition.

1.13 SAFETY

A. This Contractor shall comply with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.333), Title 29 — Labor, Chapter XIII, Bureau of Standards, Department of Labor, Part 1518 — Safety and Health Regulations for Construction; and that his housekeeping and equipment be maintained in such a manner that they comply with the Florida Industrial Commission Safety Code and Regulations of the Federal Williams — Steiger Occupational Safety and Health Act of 1970 (OSHA), wherein it states that the Contractor shall not require any laborer or mechanic employed in the performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety.

1.14 SUPERVISION

A. This Contractor shall provide a competent, experienced, full time superintendent who is acceptable to the Engineer and Owner, and who is authorized to make decisions on behalf of the Contractor.

1.15 MATERIAL AND WORKMANSHIP

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Engineer shall be furnished. Refer to substitutions in this Section.

B. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with the approval of the Owner and Engineer in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

1.16 QUIET OPERATION AND VIBRATION

A. All work shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer and the Owner. In case of moving machinery, sound, or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer and the Owner shall be corrected in an approved manner at no additional expense to the Owner.

1.17 FOUNDATIONS, SUPPORTS, PIERS, ATTACHMENTS

A. This Contractor shall furnish and install all necessary foundations, supports, pads, bases and piers required for all equipment furnished under this Division, and shall submit drawings to the Owner and Engineer for approval before purchase, fabrication, or construction of same.

B. For all floor mounted equipment, provide concrete pads which extend six inches (6") beyond equipment base in all directions with top edge chamfered. Inset six inches (6") steel dowel rods into floors to anchor pads. Shop drawings of all foundations and pads shall be submitted to the Engineer and Engineer for approval before same are constructed.

C. Construction of foundations, supports, pads, bases, and piers where mounted on the floor, shall be the same materials and same quality of finish as the adjacent and surrounding flooring material.

D. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are, in the opinion of the Owner and the Engineer, not strong enough shall be replaced as directed.

1.18 EXPOSED WORK

A. All ductwork, piping and conduit shall be concealed from view of occupied spaces and shall be concealed from view from the exterior, unless such is specifically identified on the Drawings or Specifications to be exposed.

1.19 COORDINATION WITH BEGINNING AND/OR CONTINUING BUILDING (OR FACILITY) OPERATIONS

A. Subcontractors doing work in Sections under Division 16 shall read and comply with requirements set forth as to keeping building or facilities operating in a safe and practical fashion.

1.20 MINIMUM HEAD CLEARANCE IN OCCUPIED SPACES

A. No electrical or other equipment, piping, conduit, structural framing and support elements of suspended equipment or boxed-in soffits shall be installed in a manner which occurs lower than 8'-0" above the finished floor of the area it occurs above, if people can stand or walk under it.

1.21 PROJECT CONDITIONS

A. The Contractor shall inform the Engineer of any work or materials which conflict with any of the applicable codes, standards, laws and regulations before submitting his bid.

B. The scope of the work included under this Division of the Specifications shall include complete electrical systems as shown on the plans and as specified herein. The General Conditions and Special Conditions of these specifications shall form a part and be included under this Section of the Specifications. Provide all supervision, labor, material, equipment, machinery, factory trained personnel, and any and all other items necessary to complete the electrical systems. All items of equipment are specified in the singular; however, provide and install the number of items of equipment as indicated on the drawings, and as required for complete systems.

1.22 TEMPORARY ELECTRIC

A. The Contractor will be required to furnish power for the office trailer. It will be the Contractor's responsibility to provide and pay for temporary power.

1.23 PAINTING

A. General:
1. All field painting shall be performed under the subcontract for electrical work. Each Subcontractor shall leave his work clean and free from oil, dirt, and grease and shall do field painting, where required.

B. The Contractor providing equipment, conduit, raceways, piping, etc., shall, upon completion, thoroughly clean all work to remove all dirt, grease, rust and oil. The Contractor shall vacuum clean the inside and outside of panel box and equipment cabinets. The Contractor shall clean galvanized piping, conduit,

raceway, and work in exposed areas with diluted acetic acid. He shall thoroughly prepare all such work for painting.

C. Equipment:

1. All equipment shall have factory standard finish. Where zinc chromate paint is specified to be left for painting by each Subcontractor, it shall be made up in synthetic resin vehicle.
2. Factory finished equipment which has rusted or been damaged shall be repaired, cleaned, spot primed and entirely repainted the original color by this Contractor.
3. Insulation coverings shall be cleaned, sized (if necessary), and painted for service identification by this Contractor.

D. Ferrous metal installed under this Division 16 of the Specifications which is exposed to view or to the weather, such as conduits, raceway, supports, etc., shall first be painted with one coat of priming zinc chromate.

1.24 PENETRATION OF ROOFING MEMBRANES

A. The Subcontractor providing the conduit or equipment penetrating the finished roofing or roofing membrane shall provide the roof curbing and cant system prefabricated and ready for the (General) Contractor to install, for and to which the Roofing Subcontractor shall provide and install roofing membrane and fabric base flashing.

1.25 DEFINITIONS

A. Technical Definitions:

1. "Raceway" shall mean pipe, conduit, fittings, flanges, controls, hangers, and items customarily required in connection with the transmission of electrical energy.
2. "Concealed" shall mean embedded in masonry or other construction, installed within or behind wall furring, within partitions or double partitions or hung ceilings, in crawl spaces, in shafts, in chases, buried in trenches.
3. "Exposed" shall mean not concealed.
4. "Demolition" shall be the removal of any existing equipment, and the capping or plugging of any existing services to that equipment.
5. "Furnish" means to purchase and deliver products and equipment to the project site and prepare for installation.
6. "Install" means to uncrate, assemble, erect, place, anchor and connect furnished products into satisfactory operation.
7. "Provide" means to furnish and install.

B. The term "this Contractor" when used refers to the Subcontractor of each pertinent Section of Division 16.

1.26 AMPLIFICATION

A. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of an item, in the drawings or Specifications either or both, carries with it the intent to furnish and install the item, regardless of whether or not this is explicitly stated as part of the indication or description.

B. In case of discrepancy concerning quality and/or quantity within the Contract Documents, this Contractor shall provide the better quality and/or the greater quantity unless otherwise determined in writing by the Project Engineer, at no increase to the Contract amount.

C. Where Drawings and Specifications conflict, it shall be the responsibility of this Contractor to bring such conflict to the attention of the Project Engineer for clarification. Any change from the Drawings necessary to make the work conform to the building as constructed and to fit the work of other trades or to the rules of authorities having jurisdiction, shall be made at no expense to the Owner.

1.27 QUALITY ASSURANCE

A. Standards: Certain standard materials and installation requirements are described by reference to standard specifications. These standards include the following:
1. ASA - American Standards Association.
2. ASTM - American Society for Testing and Materials.
3. ASME - American Society of Mechanical Engineers - Code of Unfired Pressure Vessels.
4. NFPA - National Fire Protection Association.
5. NEMA - National Electrical Manufacturers Association.
6. UL - Underwriters Laboratories.
7. ANSI - American National Standards Institute.
8. ASHRAE - American Society of Heating, Refrigerating, and Air Conditioning Engineers.
9. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association.
10. AMCA - Air Moving and Conditioning Association.
11. ARI - Air Conditioning and Refrigeration Institute.
12. AMA - Acoustical Materials Association.
13. NEC - National Electrical Code.
14. IEEE - Institute of Electrical and Electronic Engineers.
15. EIA - Electric Industries Associates.
16. IES - Illuminating Engineering Society.

B. Whenever a reference is made to a standard, installation and materials, the intention is such shall comply with the latest published edition at the time project is bid, unless the edition is otherwise specified herein.

C. Materials and equipment herein shall be new and standard catalogued items manufactured by reputable concerns regularly supplying such materials. Material shall bear the Underwriters' Laboratories, Inc. label (or other appropriate label) where such is required or allowed by code, by Contract Documents or by authorities having jurisdiction.

D. Codes and Rules:
1. All material furnished and all work installed shall comply with the following codes as they apply to this project:

- NFPA 70, 72 and NFPA 101.
- Florida Building Code/SREF, Current Edition.

- Regulations of the Florida Industrial Commission Concerning Safety.
- Applicable County, State and Local Building Codes.
- Local and State Fire Marshal Rules and Regulations.
- Chapter 4A-47, Florida Administrative Code—Uniform Fire Safety Standards for Elevators.
- Occupational Safety and Health Agency Standards (OSHA).
- Florida State Board of Health Rules and Regulations.
- Florida Department of Education - Office of Educational Facilities; State Requirements for Educational Facilities (SREF), Current Edition.

Applicable codes shall be those adopted by the authority having jurisdiction at the time project is bid.

E. Permits, Fees, and Inspections

1. The Contractor shall give all necessary notices, obtain all permits, and pay all government fees, sales taxes, and other costs, including utility connections or extensions, in connection with this work; file all necessary approvals of all governmental departments having jurisdiction.
2. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, and drawings required to comply with all applicable laws, ordinances, rules, and regulations.
3. The Contractor shall inform the Engineer of any work or materials which conflict with any of the applicable codes, standards, laws, and regulations before submitting their bid.

1.28 CONTRACTOR QUALIFICATIONS

A. The Contractor or Subcontractors performing work under all Sections of this Division 16 shall be regularly engaged in the type of work to be furnished under these Sections and shall be licensed under the Florida Construction Industries Licensing Boards for such specialty trades, and such firms shall employ properly qualified foremen, journeymen and apprentices as appropriate and in keeping with best trade practices.

B. Each firm shall be able to provide, upon request, a list of similar jobs it has completed.

1.29 ORGANIZATION OF THE WORK

A. Prior to starting the work, this Contractor shall carefully verify all measurements at the site and determine that the work will properly clear openings, structural members and the work of other trades. Correlate the time of each work item with all other items to the best advantage of the completed job. Furnish, in ample time to avoid delays in the work, all information required to revise footing elevations, structural elements, chases and openings in floors and walls, and to provide clearances which may be required to accommodate the work. Set all sleeves, anchor bolts and inserts required to accommodate equipment before concrete is poured or masonry is started.

B. Each Subcontractor shall maintain a complete file of all Contract Drawings, Specifications, and approved shop drawings at the site to be made available for inspection by Owner and/or Project /Engineer's representatives.

C. During construction, maintain materials and equipment in an orderly manner.

D. Provide the following accessory materials for electrical systems. Where similar accessory materials are specified with material and/or equipment, or are shown on the Drawings, the requirements of the Technical Specification Section or Drawings shall govern.
   1. Anchor bolts or other anchoring devices be of the size and type recommended by equipment manufacturer for specific application.
   2. Structural support (steel) for elevated or suspended mechanical items shall be made with connections using "simple" framing.
   3. Resilient isolation pads for motors and equipment shall be rubber-in-shear pads and of type recommended by manufacturer of the motor and equipment unless otherwise specified. (See sound proofing requirements.)
   4. Dielectric fittings shall be provided where copper joins steel, aluminum or iron, or any dissimilar metals such as insulating bushings or unions.
   5. Escutcheons shall be provided where conduits pierce exposed partitions, floors, walls or ceilings.

1.41 EXCAVATION

A. Each Subcontractor shall do trench and pit excavating and backfilling inside and outside the building, as required by his work, including shoring and bracing, pumping and protection for safety of persons and property. Trench excavations performed under this Contract whether by the Contractor or any Subcontractor shall be done in strict compliance with Florida Statute Chapter 553 Part VI "The Trench Safety Act" (See Section 553.60-553.64).

B. Remove non-usable excavated material from the site. Deposit any usable surplus material on site where directed by the Owner/Engineer. Do not remove usable material from site.

1.44 QUIET OPERATION AND VIBRATION

A. Scope:
   1. All equipment provided under Sections in this Division 16 shall operate (under all conditions of load), free of noise levels higher than specified in the pertinent. Sound and vibration conditions considered objectionable by the Owner/Engineer shall be corrected by whatever additional work is required in an approved manner at no cost to the Owner.

1.45 INSTRUCTIONS

A. After the systems are in operation, the Contractor furnishing the equipment will thoroughly instruct the designated Owner's personnel on operation and maintenance of electrical equipment and systems.

B. This Contractor shall schedule, with the Owner/Engineer/Building Inspector, a series of meetings which will be attended by several designated representatives.

C. This Contractor shall be required to provide a minimum of twenty-four (24) hours total instruction to Maintenance Department personnel. Instructions shall include the following:
   1. Location of equipment and explanation of function.
   2. Review of operating instruction manual for record and clarity.
   3. Explanation of specific maintenance requirements to be performed by the Owner.

D. This Contractor shall certify in writing that the designated personnel of the Owner (indicated above) were fully instructed in the care, operation and maintenance of all electrical equipment. This certification shall be signed by all persons attending acknowledging they attended the full instructional program.

1.47 CLEANING

A. Upon completion, raceways, panels, cabinets and equipment shall be thoroughly cleaned of dirt, grease, rust and oil, primed where necessary, and made ready for painting.

B. Clean galvanized work in exposed areas with diluted acetic acid.

C. Clean copper in exposed areas with emery cloth and solvent.

D. Clean gauges, thermostats and fittings.

1.48 LICENSE

A. The Subcontracting Firm for the electrical and systems installation shall be licensed by the State of Florida and the local authorities, regularly engaged in the installation of electrical systems, and other related equipment. The Subcontracting Firm shall be familiar with all local conditions including interpretations, codes and shall have at least five (5) years of successful installation experience on similar projects of the same magnitude and scope.

B. The Subcontracting Firm shall list at least five (5) projects it has successfully completed over the last seven (7) years for proof of experience of this caliber. This list shall be included with submittals for review by Engineer. The Subcontracting Firm shall hold a Florida State Certified Electrical Contractor license for this project. The Subcontracting firm for the fire alarm system shall be a certified "EF" installer.

1.49 AS-BUILT DRAWINGS

A. This Contractor shall provide AutoCAD as-built drawings (plotted vellums) and copies of each AutoCAD file on CD.

END OF SECTION 16050

SECTION 16060

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Grounding Electrodes and Conductors.

B. Equipment Grounding Conductors.

C. Power System Grounding/Bonding.

D. Communication System Grounding.

E. Electrical Equipment and Raceway Grounding and Bonding.

F. Building Grounding/Bonding.

1.2 RELATED SECTIONS

A. Section 16289 Surge Protective Device (SPD).

1.3 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70 / NEC 14 Article 250.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. (UL) or NRTL, as suitable for purpose specified and shown.

1.4 SYSTEM DESCRIPTION

A. Ground the electrical service system neutral and each separately-derived system (i.e., transformers and generators) neutral at service entrance equipment to metallic water service, concrete encased rebar, to building steel, and to supplementary grounding electrodes.

B. All low voltage communication systems shall be bonded per the grounding detail.

1.5 SUBMITTALS

A. Submit shop drawings.

B. Indicate location of system grounding electrode connections and routing of grounding electrode conductor.

1.6 PERFORMANCE REQUIREMENTS

A. The grounding system installed on permanent building and structures shall provide a maximum of 5 ohms resistance to ground.

PART 2 - PRODUCTS

2.1 ROD ELECTRODE

A. Material: Copper-clad steel.

B. Diameter: 3/4 inch.

C. Length: 20 feet minimum.

2.2 MECHANICAL COUPLINGS (GROUND RODS)

A. Material: Bronze.

2.3 WIRE

A. Material: Solid copper 4 AWG and smaller. Stranded copper larger than 4 AWG.

B. Foundation Electrodes: 2 AWG.

C. Grounding Electrode Conductor: Size to meet National Electrical Code Table 250 requirements.

2.4 GENERAL

A. All connections shall be exothermic welds to made electrodes. Access boxes shall be provided for inspections, whether in sidewalks, concrete, or landscape areas.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing. Minimum twenty feet (20') per NEC.

D. Provide grounding and bonding at Utility Company's metering equipment and pad-mounted transformer.

E. Connect grounding electrode conductors to metal water pipe using a suitable ground clamp. Make connections to flanged piping at street side of flange. Provide bonding jumper around water meter.

F. Provide bonding to meet Regulatory Requirements.

G. Bond together metal siding not attached to grounded structure.

H. Bond together each metallic raceway, pipe, and other metal objects.

I. Provide equipment grounding conductors in all raceways including FAS/Intercom or Paging/CATV/Data/Telecommunications/Power/Lighting/etc. per NEC. A minimum #4 AWG insulated bonding/grounding conductor shall be installed for telecommunication, CATV, intercom and data systems. A minimum #12 shall be installed for fire alarm and power/lighting systems. Color of conductor shall be per Section 16120-3.04 (J).

J. Provide a separate, insulated equipment grounding conductor in feeder and branch circuits. Terminate each end on a grounding lug, bus, or ground bar.

K. The following systems and/or equipment shall be bonded in strict accordance with the NEC as minimum requirements:
1. Fire alarm systems.
2. Intercommunication systems.
3. Building power/lighting systems.
4. Raceway and conduit systems.
5. Telecommunication systems.
6. Lightning protection systems/TVSS.
7. Non-current carrying metal parts of all motors, panels, and other electrically operated equipment.
8. CATV Systems.

L. Use minimum 1 AWG copper conductor for communications service bonding conductor.

M. All connections to ground rods, footer steel and ground rings shall be made by exothermic welds.

N. All ground rod installations shall be a minimum 20' in total length.

3.3 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Prior to energizing, measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 5 ohms.

C. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method. Submit test results to Engineer for review and approval.

3.4 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of grounding electrodes.

B. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

END OF SECTION 16060

SECTION 16070

SUPPORTING DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Conduit and Equipment Supports.

B. Fastening Hardware.

C. Luminaire Supports.

1.2 COORDINATION

A. Coordinate size, shape, and location of concrete pads.

1.3 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Support Channel: Galvanized or Painted Steel or Aluminum (Interior). Aluminum or Stainless Steel (Exterior).

B. Hardware: All exterior hardware (nuts, bolts, screws, washers, etc.) shall be stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten hanger rods, conduit clamps, outlets, and junction boxes to building structure using expansion anchors, beam clamps, or spring steel clips. All supporting devices and hardware shall be UL listed for that purpose and per other sections of this specification. In no case will the support device be less than this specification or the manufacturer's requirements and standards for the equipment/material to be supported.

B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

C. All raceways shall be independently supported to building structure. Do not use boxes with attached conduit brackets as sole conduit support.

D. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

E. Do not use powder-actuated anchors.

F. Do not drill structural steel members. Limited to strapping conduit. All other holes shall have Structural Engineer's approval prior to cutting or drilling.

G. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

H. In wet locations, install free-standing electrical equipment on concrete pads.

I. Install surface-mounted cabinets and panelboards with minimum of four (4) anchors.

J. Bridge studs (top and bottom) with channels to support flush-mounted cabinets and panelboards in stud walls.

K. Safety of Overhead Materials, Fixtures, and Equipment (Reference Specification Section 16510, Luminaires):

1. Troffer or Lay-In Fixtures
    a. Typical 2' x 4', 1' x 4', and 2' x 2' lay-in light fixtures shall be independently supported at all four corners with a minimum #12 solid galvanized wire to building structure (i.e., four (4), independent, support/tie wires to each fixture). Support wires shall not exceed 45º angles to support means.
2. Surface Mounted Fixture
    a. Each surface mounted fixture on plaster ceilings, shall be secured to lighting outlet box and shall be installed with two (2), ¼-20 toggle bolts (one on each end).
    b. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure. (i.e., four (4), independent, support/tie wires to each fixture, or ¼" all thread to bar joist or to unistrut bolted to bar joist). Support wires shall not exceed 45º angles to support means.
3. Pendant Mounted/Suspended Fixture
    a. Grid Ceilings: Each pendant mounted fluorescent light fixture shall be independently secured by a secondary and supplementary system of two (2) wires from the canopy and support system of each pendant leg of such fixtures to the building's structural framing above.
    b. Plaster Ceilings: Each surface mounted fixture on plaster ceilings, shall be secured to lighting outlet box and shall be installed with two (2), ¼-20 toggle bolts (one on each end).
    c. Install suspended luminaires using pendants supported from swivel hangers. Provide pendant length required to suspend luminaires at indicated height.

4. Recessed Fixtures
   a. Grid Ceiling: Each recessed fixtures shall be independently supported at all four corners with a minimum #12 solid galvanized wire to building structure (i.e., four (4), independent, support/tie wires to each fixture). Support wires shall not exceed 45º angles to support means.
   b. Plaster Ceilings: Support recessed luminaires in hard ceiling directly from building structure. (i.e., four (4), independent, support/tie wires to each fixture). Support wires shall not exceed 45º angles to support means.
5. Wall Mounted Fixtures
   a. Each wall mounted fixture shall be secured to lighting outlet box and shall be installed with either two (2) ¼" 20 toggle bolts, or tapcons or metal screws secured to block or stud walls.
6. Exit Signs
   a. Install exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend exit sign at indicated height. Outlet box shall be supported by T-Bar hanger with one tie wire to structural support.
7. Other similar equipment (heavy speakers, etc.) shall be similarly secured with and independent secondary and supplementary support system.

END OF SECTION 16070

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Nameplates and Tape Labels.

B. Wire and Cable Markers.

C. Conduit System Junction Box and Pull Box Color Coding.

1.2 SUBMITTALS

A. Include schedule for nameplates and tape labels.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Phenolic Nameplates: Engraved, three-layer, laminated plastic with black letters on a white background. For emergency panels and equipment, engraved, three-layer, laminated plastic with white letters on a red background.

B. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Secure nameplates to equipment fronts using screws or rivets. Secure nameplate to inside face of recessed panelboard doors in finished locations.

D. Embossed tape will not be permitted for any application.

E. Every circuit and circuit modification shall be legibly identified as to its clear, evident, and specific purpose or use, not limited to lights and receptacles. Transformer/switchboard/panelboard identification shall include sufficient detail to allow each circuit to be distinguished from all others. The identification shall be included in a circuit directory that is located on the face or inside of the panel door in the case of a panelboard, and located at each switch on a switchboard. For any panelboard or switchboard, a laminated affixed label shall be provided with the following information: Equipment I.D., voltage, phase, amperage, panelboard or switchboard from where served, circuit number, rating of circuit

feeder (overcurrent device), and from where the overcurrent device is fed. Label shall be a single, one-piece application/unit.

F. Service disconnect identification shall be provided on the exterior of all covers of enclosures. A laminated affixed label shall be provided with the following information: what it serves, where served from (panel), service circuit number, and circuit rating.

G. Panel schedules shall be typewritten by F.I.S.H. room number. Changes and/or additions shall be updated per this standard.

H. Special application switches shall be provided with a laminated affixed labels.

I. All affixed laminated labels to be pop-riveted to panel cover in a neat and workman-like manner. Wall mounted labels shall be mounted in a permanent manner not relying on adhesive.

3.2 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.

3.3 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates of minimum letter height as scheduled below:
1. Panelboards: 1/4 inch; identify equipment designation. 1/8 inch; identify voltage rating and source.
2. Individual Circuit Breakers, Switches, and Motor Starters in Panelboards, Switchboards, and Motor Control Centers: 1/8 inch; identify circuit and load served, including location.
3. Individual Circuit Breakers, Enclosed Switches, and Motor Starters: 1/8 inch; identify load served.

3.04 CONDUIT SYSTEM, JUNCTION BOX, AND PULLBOX COLOR CODING SCHEDULE

A. Identify conduit system junction boxes and pull boxes, as scheduled below:
1. Emergency Distribution System: Orange.
2. 208 Volt, Single and Three Phase System: Brown.
3. Fire Alarm System: Red.
4. Motor and Other Control Systems: Purple.
5. Telephone System: Black.
6. Television System: Green.
7. Intercom/Zone Paging: Blue.

END OF SECTION 16075

SECTION 16100

BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building Wire and Cable.

B. Remote Control and Signal Cable.

C. Power Limited Fire Protective Signaling Cable.

D. Wiring Connectors and Connections.

1.2 RELATED SECTIONS

A. Section 16129 Conduit and Raceways.

B. Section 16128 Boxes.

C. Section 16075 Electrical Identification.

1.3 REFERENCES

A. ANSI/NFPA 70—National Electrical Code.

B. NEMA WC5—Thermoplastic-insulated wire and cable for the transmission and distribution of electrical energy.

1.4 PROJECT CONDITIONS

A. Verify that field measurements are as shown on drawings.

B. All conductors shall be copper.

C. Conductor sizes are based on copper.

D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.5 COORDINATION

A. Determine required separation between cable and other work.

B. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

A. Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: ANSI/NFPA 70, Type THHN/THWN, XHHW material rated 75°C.

2.2 CLASS 1 REMOTE CONTROL AND SIGNAL CABLE

A. Description: ANSI/NFPA 70, Type TFFN, THHN.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

2.3 CLASS 2 OR 3 REMOTE CONTROL AND SIGNAL CABLE

A. Description: NEMA/ICEA WC5, thermoplastic insulated cable, individual insulated conductors twisted together, metallic shielded and covered with PVC jacket when installed in metal raceway.

B. Conductor: Copper, stranded.

C. Insulation Voltage Rating: 300 volts.

2.4 CLASS 1 AND NON POWER — LIMITED FIRE PROTECTIVE SIGNALING CABLES

A. Description: NEMA/NFPA 70, Type TFFN, THHN installed in metal raceway.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

2.5 POWER LIMITED FIRE PROTECTIVE SIGNALING CABLES

A. Description: NEMA/NFPA 70, Type TFFN, THHN installed in metal raceway.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

2.6 POWER LIMITED FIRE PROTECTIVE SIGNALING CABLES

A. Description: NEMA/NFPA 70, Type FPL, FPLR installed in metal raceway.

B. Conductor: Copper.

C. Insulation Voltage Rating: 300 Volts.

2.7 POWER LIMITED FIRE PROTECTIVE SIGNALING CABLES

A. Description: NEMA/NFPA 70, Type FPLP installed in metal raceway.

B. Conductor: Copper.

C. Insulation Voltage Rating: 300 volts.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work, likely to damage wire and cable, has been completed.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

A. Concealed Dry Interior Locations: Use only building wire and cable (all types) in raceway.

B. Exposed Dry Interior Locations: For feeders, branch circuits, and Class 1 remote control circuits, use only building wire in raceway. For Class 2 or 3 control cable and power limited fire protective signaling cables, run in raceway.

C. Above Accessible Ceilings: For feeders, branch circuits and Class 1 remote control cables use only building wire in raceway. For Class 2 or 3 remote control cables run exposed. For power limited fire protective signaling cables, run in raceway.

D. Wet or Damp Interior Locations: For feeders, branch circuits and Class 1 remote control cables use only building wire in raceway. For Class 2 or 3 remote control cable and power limited fire protective signaling cables run in raceway.

E. Exterior Locations: For feeders, branch circuits and Class 1 remote control cables, use only building wire run in raceway. For Class 2 or 3 remote control cables and fire protective signaling cables, run in raceway.

F. Underground Installations: For feeders, branch circuits and Class 1 remote control cables, use only building wire run in raceway. For Class 2 or 3 remote control cables and power limited fire protective signaling cables, run in raceway.

G. Use wiring methods indicated on drawings.

3.4 INSTALLATION

A. Install products in accordance with manufacturer’s instructions.

B. If stranded conductors are used for branch-circuits, the devices shall be pressure terminal type.

C. Use stranded conductors for control circuits and for feeder and branch circuits No. 10 and larger.

D. Use conductor not smaller than #12 AWG for power and lighting circuits.

E. Use conductor not smaller than #14 AWG for control circuits.

F. Use #10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.

G. All phase conductors size #10 and smaller shall have color coded insulation. Conductor size #8 and larger shall be color coded by the use of colored plastic tape applied within 6" of each conductor end. All color coding shall be with the same color being used with its respective phase or bus through the entire length of conductor with enclosures, boxes, cabinets, wireways, panels, switchboards, as follows:

120/208 Volts	
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Ground	Green
Travelers	Purple

H. Grounded conductors (neutral) shall be identified with a continuous outer finish that is white or gray on #6 and smaller. Color coding with plastic tape or other means is not acceptable. Grounded conductors (larger than size #6) shall be color coded at 12" intervals with a continuous white or gray outer finish or by three continuous white stripes on other than green insulation along its entire length by a distinctive white marking at its terminations. This marking shall encircle the conductor or insulation.

I. Equipment grounding conductors shall be identified with a continuous outer finish that is either green or green with one or more yellow stripes for size #6 and smaller. Color coding with plastic tape or other means is not acceptable. Grounding conductors (larger than size #6) shall be color coded at each end and at every point where the conductor is accessible. Identification shall encircle the conductor and shall be accomplished by one of the following:
   1. Stripping the insulation or covering from the entire exposed length.
   2. Coloring the exposed insulation or covering green.

J. Use suitable wire pulling lubricant for building wire #4 AWG and larger.

K. Protect exposed cable from damage.

L. All conduits entering boxes, enclosures, cabinets, wireways, etc., shall be labeled with a suitable approved permanent marker identifying the appropriate panel/panelboard and branch circuit number serving same. The same shall apply to all enclosure covers.

M. Use suitable cable fittings and connectors.

N. Neatly train and lace wiring inside boxes, equipment, and panelboards.

O. Clean conductor surfaces before installing lugs and connectors.

P. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

Q. Use Utilco blocks for copper conductor splices and taps, #6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

R. Terminate spare conductors with electrical tape or wirenut.

S. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, #8 AWG and smaller.

T. Splice only in accessible junction boxes.

U. Do not use quick-connect splice devices.

V. Feeders and service entrances (as defined by NEC Article 100) shall not be spliced.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Identify wire and cable under provisions of Section 16075.

3.6 FIELD QUALITY CONTROL

A. Perform field inspection and testing.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Verify continuity of each branch circuit conductor.

E. Verify continuity of each control circuit conductor.

F. Verify proper phasing of conductors prior to energizing or reenergizing any and all electrical equipment.

END OF SECTION 16100

SECTION 16128

BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall and Ceiling Outlet Boxes.

B. Pull and Junction Boxes.

C. In-Ground Cast Concrete Boxes.

D. FS/FD Cast Device Boxes.

1.2 RELATED SECTIONS

A. Section 16050 Basic Electrical Requirements.

B. Section 16140 Wiring Devices.

C. Section 16131 Cabinets and Enclosures.

D. Section 16060 Grounding and Bonding.

E. Section 16075 Electrical Identification.

1.3 REFERENCES

A. ANSI/NEMA OS 1—Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

B. ANSI/NFPA 70—National Electrical Code.

C. NEMA 250—Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 PROJECT CONDITIONS

A. Verify field measurements are as shown on drawings.

B. Verify locations of floor boxes and outlets to rough-in.

C. Electrical boxes are shown on drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

PART 2 PRODUCTS

2.1 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required. Minimum depth—2½-inches.
2. Concrete Ceiling Boxes: Concrete type.

B. Cast Boxes: NEMA FB 1, Type FD, cast feralloy deep type. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.2 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel. Minimum depth — 2½ inches.

B. Surface-Mounted Cast Metal Box: NEMA 250, Type 4, flat-flanged, surface-mounted junction box.
1. Material: Stainless Steel.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install electrical boxes, as shown on drawings and as required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements.

B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
Boxes shall not be installed more than 4 feet above finished ceiling. Use 3/8" threaded rod for box support. Double nut all support points.

D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire. Openings shall be a minimum 24” x 24” hinged door with cylinder cam.

E. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods that are UL listed and tested.

F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

G. Use flush mounting outlet boxes in finished areas.

H. Do not install flush mounting boxes back-to-back in walls; provide minimum 12 inch separation. Provide minimum 24 inches separation in fire-rated walls. Through-the-wall boxes are not allowed.

I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

J. Use stamped steel bridges to fasten flush mounting outlet box between studs.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Use adjustable steel channel fasteners for hung ceiling outlet box.

M. Do not fasten boxes to ceiling support wires.

N. All boxes and enclosures, including wiremold boxes, shall be grounded by use of a threaded ground lug/screw. No ground clips acceptable. This shall apply to new and existing installations.

O. Use gang box where more than one device is mounted together. If sectional boxes are used, barriers are required to separate different voltage systems.

P. Use gang box with plaster ring for multiple devices mounted together.

Q. Use FD malleable outlet boxes in exterior locations exposed to the weather, wet locations, kitchens, and toilet rooms where surface mounted with weatherproof “while-in-use” cover. Standard weather proof cast boxes are not acceptable.

R. Large Pull Boxes: Boxes larger than 100 cubic inches (1-600 cubic centimeters) in volume or 12 inches (300 mm) in any dimension.
   1. Interior Dry Locations: Use hinged enclosure under provisions of Section 16160.
   2. Other Locations: Use surface-mounted cast metal box.

S. Interior PVC boxes, PVC junction boxes, PVC pull boxes, and PVC enclosures are not acceptable for any purpose.

T. Cabinets, enclosures, wire-ways, junction boxes, etc., shall be color identified per the following color schedule. Also, each raceway entry shall be similarly identified for approximately 12" in length at the box/conduit termination for all items listed below and at ten foot intervals for Fire Alarm and Emergency.

   Fire Alarm: Red
   Emergency: Orange
   Data/Tech/Telephone: Black
   C.C.T.V.: Green
   Intercom: Blue

U. All boxes are to be supported to building structure or building structural support with approved supports and hardware suitable for the task. No box, cabinet, or enclosure will be supported by the conduit or raceway only.

V. All boxes, junction boxes, and enclosures shall have the exterior cover marked identifying the branch circuit and panelboard of origination with an indelible ink marker or grease pencil.

W. Myers hubs shall be used on all exterior boxes or enclosures where the conduits terminate on top of box or enclosure. Sealing lock nuts or Myers hubs shall be used where the conduits enter the side or bottom of the box or enclosure.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations and sizes of required access doors with Construction Manager/General Contractor and other trades.

B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

C. Coordinate heights and locations of outlets mounted above counters, benches, and backsplashes.

D. Position outlet boxes to locate luminaries as shown on reflected ceiling plan.

E. Outlet boxes for exit lights shall be wall-mounted, where possible, and installed no higher than 24 inches above door frame. Where exit lights are suspended, the box and/or light fixture shall be rigidly secured.

3.3 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in all unused box openings.

END OF SECTION 16128

SECTION 16129

CONDUIT AND RACEWAYS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal Conduit.

B. Flexible Metal Conduit.

C. Liquidtight Flexible Metal Conduit.

D. Electrical Metallic Tubing.

E. Non-Metal Conduit.

F. Fittings and Conduit Bodies.

1.2 RELATED SECTIONS

A. Section 16128 Boxes.

B. Section 16060 Grounding and Bonding.

C. Section 16070 Supporting Devices.

D. Section 16075 Electrical Identification.

1.3 REFERENCES

A. ANSI C80.1—Rigid Steel Conduit, Zinc Coated.

B. ANSI C80.3—Electrical Metallic Tubing, Zinc Coated.

C. ANSI/NEMA FB 1—Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

D. ANSI/NFPA 70—National Electrical Code.

E. NECA "Standard of Installation."

F. NEMA TC 2—Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

G. NEMA TC 3—PVC Fittings for Use with Rigid PVC Conduit and Tubing.

H. UL651A—Type EB and A Rigid PVC Conduit and HDPE Conduit.

I. UL651B—Continuous Length HDPE Conduit.

1.4 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual routing of conduits larger than 1-1/4 inches.

B. Accurately record actual routing of all underground conduits.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle Products to site under.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.7 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

A. Homeruns shall be a minimum size of three-quarter inch (¾"), unless otherwise specified. Provide a minimum of half-inch (½") for flexible connections to equipment.

B. Underground Installations:

1. Use thickwall nonmetallic conduit, Schedule 80 PVC.

2. In or Under Slab-on-Grade: Use Schedule 80 PVC. Use only UL listed and approved fittings for coupling and change-over to different type raceways.

3. Minimum Size: ¾".

4. Install rigid steel, long radius elbows for conduits larger than one inch (1").

5. Under slab conduit or poured-in concrete conduit shall be painted with a coat of bitumastic. The bitumastic shall be continuous and continue up through penetration of concrete slabs, up to 12" A.F.G. Corrosion tape is acceptable.

C. Outdoor Locations, Above Grade: Use rigid and liquidtight flexible metal conduit with enhanced corrosion. Provide completely coated of the rigid conduit with an alkali and rust resistant bitumastic paint, Kopper NO. 50.

D. Wet and Damp Locations: Use rigid steel, intermediate, and liquidtight flexible metal conduit.

E. Dry Locations:

1. Concealed: Use rigid steel, intermediate metal conduit, and electrical metallic tubing.

2. Exposed:

a. Exterior—Rigid Steel only.

b. Interior—Rigid Steel to 4'0" A.F.G., then Electrical Metallic Tubing.

2.2 METAL CONDUIT

A. Rigid Steel and Intermediate Metal Conduit: ANSI C80.1.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings.

2.3 FLEXIBLE METAL CONDUIT

A. Description: For exposed locations, interlocked steel construction. For concealed locations- interlocked steel construction.

B. Fittings: ANSI/NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.

B. Fittings: ANSI/NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel set screw or steel compression coupling or connectors. All connectors shall be insulated throat, up to one inch.

2.6 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All thru-slab conduits and raceways larger than one inch (1") installed into block masonry walls and through slabs shall be rigid galvanized conduit to the first enclosure, cabinet, panelboard/switchboard, or box/outlet. All exposed/surface mounted raceways thru slabs to panelboards/ switchboards, enclosures, cabinets, conduits and boxes shall be rigid galvanized conduits entering into same enclosures with no junction boxes.

B. PVC conduits and raceways are only permitted underground or under slabs. Exception: PVC is permitted within block walls to first outlet box A.F.F. if PVC raceway is one inch (1") trade size or smaller.

C. All exterior conduits and raceways shall be rigid galvanized steel conduit. EMT and PVC shall not be used.

D. PVC sweeps into utility transformers shall be permitted.

E. All above ceiling and within partition wall raceways and conduits shall be EMT, intermediate metal conduit or rigid galvanized conduit. PVC is not permitted above the ceiling spaces.

F. EMT Fittings (connectors/couplings) shall be steel set screw or steel compression type. Fittings in wet locations shall be compression type.

G. All raceway terminations at boxes and enclosures one inch (1") and smaller shall be made with insulated throat connectors. RMC, intermediate metal conduit to comply with NEC.

H. All raceway terminations at boxes and enclosures larger than one inch (1") shall be made with insulated throat connectors or metallic insulated bushings. Plastic bushings are not acceptable. Conduits/raceways enclosing #3 or larger conductors shall have connectors with insulated throat or use metal insulated bushings.

I. All raceways and conduits within concrete second floor and above slabs shall be intermediate metal conduit, rigid galvanized conduit, or PVC. EMT is not acceptable.

J. Threadless connectors and couplings for intermediate metal conduit and rigid galvanized conduits are not permitted.

K. Exposed and surface mounted raceway systems shall have two approved supporting devices per 10' length as equally spaced as practical.

L. All conduit and raceway systems shall have UL approved supports (equal to Erico Caddy® SK-I Clamp) within three feet (3') of boxes or enclosures and couplings/fittings/condulets. Bar Joist spacing exceeding three feet (3') shall meet the N.E.C. 5' exception to the rule for support.

M. All raceways and conduits installed underground shall have a minimum burial depth of 24" to the top of conduit. Service entrance conduits and raceways shall have a minimum burial depth of 36" to the top of the conduit. All underground conduits and raceways not under building slabs shall have a yellow marker tape installed above its entire length placed approximately 12" below the finished grade. (Horizontal boring methods are an exception.)

N. All raceway and conduits installed under-slabs and under-buildings shall be installed under the slab and not within the concrete pour or slab.

O. Tie-wire, tie-wrap, duct tape, etc. Shall not be permitted as a means of support for any conduit or raceway system. All conduits and raceways shall be adequately supported with U.L. approved supporting devices.

P. All flexible conduits in exposed areas shall be steel or metal seal-tite. All flexible raceways in damp or wet locations shall be metal seal-tite. All flexible conduits above suspended lay-in ceilings shall be aluminum or steel. Flexible conduits are not permitted above drywall, plaster or hard ceilings where not accessible.

Q. Seal tight or flexible conduit shall NOT be installed through walls.

R. Horizontal runs of conduit in masonry walls is not permissible.

S. All conduit shall be concealed whenever possible. Concealed conduit run above the ceiling shall be supported independent of ceiling supports. When a lay-in type ceiling is utilized, the conduit must be installed high enough to permit removal of ceiling tile.

T. Home-Run conduits are to be a minimum of ¾" trade size to first point of use box/enclosure. Branch circuit conduits for lighting and receptacles shall be filled a maximum of three (3) phase/hot conductors.

U. A minimum of two spare ¾" conduits shall be stubbed out of each panelboard or panel to building structure above and terminated in a J-box with cover. Conduits stubs shall also be capped at top with approved fittings where not terminating in a box.

V. Conduit systems shall be racked and run in parallel and perpendicular from its point or origin (i.e., panelboard/panel/switchboard, systems cabinet, etc.) To its destination or first termination. Authority having jurisdiction shall approve any deviation or conflicts with this rule. All conduits after the first point of termination shall be run parallel with or at right angles to building walls or building structure.

W. Conduit shall be continuous from outlet to outlet, from outlet to cabinet, junction box to pull box in such a manner that each system shall be electrically continuous from point of service to all outlets.

X. When hot dipped rigid galvanized steel conduit is installed below grade, it shall be coated with an asphalt trim paint or approved corrosion tape.

Y. Any conduit that penetrates a firewall shall be sealed with a fire barrier caulk or similar compound to preserve the fire rating of the wall. Fire-rated foam spray is acceptable.

Z. Conduits not terminating in boxes and unused shall be capped.

AA. All empty conduits and raceways shall have a pull-string installed capable of pulling conductors typical of conduit size.

BB. Conduit/raceway chases to above-ceiling spaces for all cable drops communication, data, CATV and telephone shall have a bushing at the top of the conduit/raceway for protection or terminated in an approved box.

CC. Provide a yellow marker ribbon above all conduits installed underground. The marker shall be installed/place 12" below finished grade. Marker tape shall be typical industry standard. (Horizontal boring methods are the exception.)

DD. Install conduit in accordance with NECA "Standard of Installation."

EE. Install nonmetallic conduit in accordance with manufacturer's instructions.

FF. Arrange supports to prevent misalignment during wiring installation.

GG. Arrange conduit to maintain headroom and present neat appearance. Minimum headroom for equipment suspended from ceiling or building structure shall be 6’8” unless otherwise specified.

HH. Route exposed conduit parallel and perpendicular to walls. Exposed conduits shall only be run in mechanical and electrical rooms unless otherwise specified.

II. Maintain 12" clearance between conduit and surfaces with temperatures exceeding 104°F (40°C) unless otherwise specified.

JJ. Cut conduit square using saw or pipecutter; de-burr cut ends. Bring conduit to shoulder of fittings; fasten securely.

KK. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

LL. Install no more than equivalent of four (4) 90° bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender or factory elbows for bends in metal conduit larger than 2" size.

MM. Provide fittings designed to accommodate expansion and deflection where conduit crosses, control, and expansion joints.

NN. Flexible metal conduit shall be used for a flexible connection only, not raceways.

OO. Install grounded metal insulated bushing with lug on all mains, sub-feeders, switchboards, panelboards, transformers, chillers, disconnects, and equipment rated at 100 amps and above.

PP. Install and seal boxes and conduit in acoustical treated walls and ceilings per architectural acoustics specifications.

QQ. All work shall be done in a neat and workman like manner per NECA “Standard of Installation.”

3.2 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods that are UL listed and tested.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified.

END OF SECTION 16129

SECTION 16131

CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Hinged Cover Enclosures.

B. Terminal Blocks and Accessories.

1.2 REFERENCES

A. NEMA 250—Enclosures for Electrical Equipment (1000 Volts Maximum).

B. ANSI/NEMA ICS 1—Industrial Control and Systems.

C. ANSI/NEMA ICS 4—Terminal Blocks for Industrial Control Equipment and Systems.

D. ANSI/NEMA ICS 6—Enclosures for Industrial Control Equipment and Systems.

1.3 SUBMITTALS

A. Submit product data.

B. Shop Drawings for Equipment Panels: Include wiring schematic diagram, wiring diagram, outline drawing and construction diagram as described in ANSI/NEMA ICS 1.

PART 2 - PRODUCTS

2.1 HINGED COVER ENCLOSURES

A. Construction: NEMA 250; Type 1 steel.

B. Finish: Manufacturer's standard enamel finish.

C. Covers: Continuous hinge, held closed by flush latch operable by key.

D. Panel for Mounting Terminal Blocks or Electrical Components: 14 gauge steel, white enamel finish.

2.2 TERMINAL BLOCKS AND ACCESSORIES

A. Terminal Blocks: ANSI/NEMA ICS 4; UL listed.

B. Power Terminals: Unit construction type, closed-back type, with tubular pressure screw connectors, rated 600 volts.

C. Signal and Control Terminals: Modular construction type, channel mounted; tubular pressure screw connectors, rated 300 volts.

D. Copper Ground Bar Strip with #6 Copper Grounding: Bonding conductor to building main grounding buss.

2.3 MANUFACTURERS

A. Burndy #RK Series.

B. Buss.

C. Belden.

2.4 FABRICATION

A. Shop assemble enclosures and cabinets housing terminal blocks or electrical components in accordance with ANSI/NEMA ICS 6.

B. Provide conduit hubs on enclosures.

C. Provide protective pocket inside front cover with schematic diagram, connection diagram, and layout drawing of control wiring and components within enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide accessory feet for free-standing equipment enclosures.

B. Install trim plumb.

C. All exterior mounted enclosures shall be NEMA 3R.

D. Any conduit penetrations made on the top or sides of exterior mounted enclosures shall be made using a manufactured hub or hub assembly.

E. No penetrations shall be made in an exterior mounted enclosure on the sides of enclosure higher than the bottom third of the enclosure.

END OF SECTION 16131

SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wall Switches.

B. Receptacles.

C. Device Plates and Decorative Box Covers.

D. Floor Box Service Fittings.

1.2 RELATED SECTIONS

A. Section 26 05 32 Boxes.

1.3 REFERENCES

A. NEMA WD 1—General Purpose Wiring Devices.

B. NEMA WD 5—Specific Purpose Wiring Devices.

C. NEMA WD 6—Wiring Device Configurations.

D. Federal Specification—FS-W-C-596 Series—General Specifications.

E. Federal Specification—FS-W-S-896 Series—Toggle Switches.

1.4 SUBMITTALS

A. Submit Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

B. Manufacturer's Instructions:

1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

A. Manufacturers:
1. Arrow Hart.
2. Hubbell.
3. Leviton.
4. Pass & Seymour.
5. Substitutions: Under provisions of Division 1.

B. Description: NEMA WD 1, heavy-duty industrial grade AC only general-use snap switch.

C. Device Body: Ivory plastic with toggle handle.

D. Indicator Light: Separate pilot strap; red color lens.

E. Locator Light: Lighted handle type switch; red color handle.

F. Voltage Rating: 120-277 volts, AC.

G. Current Rating: 20 amperes.

H. Motor Rating: Motor rated for fractional horsepower.

I. Motors 1/2 HP and Smaller: Provide switch with thermal overloads to match motor nameplate rating, if motor does not have built-in overload protection.

2.2 RECEPTACLES

A. Manufacturers:
1. Arrow Hart.
2. Hubbell.
3. Leviton.
4. Pass & Seymour.
5. Substitutions: Permitted.

B. Description: NEMA WD 1; heavy-duty industrial grade general-use receptacle.

C. Device Body: Ivory plastic for general use receptacles.

D. Configuration: NEMA WD 6; type as specified and indicated.

E. Convenience Receptacle: NEMA Type 5-20.

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

G. Range, dryer, and special purpose receptacles shall be four (4) wire/grounding type. This Contractor shall verify equipment housing has not been bonded by the manufacturer.

2.3 WALL PLATES

A. Decorative Cover Plate: Smooth stainless steel, only. Confirm with Owner.
1. Hubbell.
2. Leviton.
3. Pass & Seymour.
4. Substitutions: Permitted.

B. Weatherproof Cover Plate: Gasketed, cast aluminum with hinged, gasketed device cover. Cover shall be key lockable.
   1. Hubbell.
   2. Carlon.
   3. Substitutions: Permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and will be completely covered by wall plates.

C. Verify floor boxes are adjusted properly.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

C. All devices shall be U.L. listed and labeled. Prior to installation, all wiring devices shall be stored on the jobsite in the original labeled cartons.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's instructions. All wiring devices shall be of one manufacturer; no mixing of manufacturers shall be permitted.

B. Install devices plumb and level.

C. Install switches in the vertical position with OFF position down.

D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging, as instructed by manufacturer.

E. Do not share neutral conductor on load side of dimmers.

F. Install receptacles with grounding pole on bottom.

G. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

H. Connect wiring devices by wrapping conductor clockwise around screw terminal. “Quick wire”/push-in/snap-in residential type wiring devices shall not be permitted. Receptacles and switches shall be pig-tailed, no feed through wiring.

I. Install galvanized and raised steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

J. Assemble all devices and equipment shipped loose with furniture furnished by others as a part of this project. Provide all necessary wiring, plugs, conduit, etc., required to complete this work.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights specified and indicated on drawings.

B. Install wall switch at forty-eight inches (48") above finished floor to top of outlet box.

C. Install convenience receptacle at twenty inches (20") above finished floor to top of outlet box.

D. Install convenience receptacle at six inches (6") to top of outlet box, above backsplash of counter, and coordinate with Architectural drawings.

E. Install dimmer at forty-eight inches (48") above finished floor to top of outlet box.

F. Install telephones and computer outlet boxes at twenty inches (20") above finished floor to top of outlet box.

G. Install telephone and computer outlet boxes at six inches (6") to top of outlet box, above backsplash of counter, and coordinate with Architectural drawings.

3.5 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation. Using a tester specifically designed to test GFCI receptacles or branch circuits.

3.6 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

END OF SECTION 16140

SECTION 16150

EQUIPMENT WIRING CONNECTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electrical connections to equipment.

B. Related Sections:
1. Section 16123 - Low-Voltage Electrical Power Conductors and Cables.
2. Section 16128 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

A. National Electrical Manufacturers Association:
1. NEMA WD 1 - General Requirements for Wiring Devices.
2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

A. Product Data: Submit wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

B. Manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.5 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer’s wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.1 CORD AND PLUGS

A. Manufacturers:
1. Pass & Seymour
2. Hubbell
3. Leviton.

B. Attachment Plug Construction: Conform to NEMA WD 1.

C. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.

D. Cord Construction: Type SO SJO multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - -EXECUTION

3.1 EXAMINATION

A. Verify equipment is ready for electrical connection, for wiring, and to be energized.

B. Extend equipment connections using materials and methods compatible with electrical installations, or as specified.

3.2 INSTALLATION

A. Make electrical connections.

B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Install receptacle outlet to accommodate connection with attachment plug.

E. Install cord and cap for field-supplied attachment plug.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.3 ADJUSTING

A. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION 16150

SECTION 16265

VARIABLE FREQUENCY CONTROLLERS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Variable Frequency Controllers.

B. Fuses.

C. Enclosures.

1.2 SCOPE OF WORK

A. It is the intent of this specification for the Division 15 Contractor to provide the VFD equipment. It is the intent for this Division 16 Contractor to provide power and SPD for each drive, as described herein.

1.3 RELATED SECTION

A. Section 16289 Surge Protective Device (SPD).

1.4 REFERENCES

A. ANSI/UL 198C—High-Intensity Capacity Fuses; Current Limiting Types.

B. ANSI/UL 198E—Class R Fuses.

C. Underwriters Laboratory—U.L. 508.

D. NEMA KS 1—Enclosed Switches.

1.5 SUBMITTALS

A. Submit product data.

B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS—(by Division 15)

2.2 PRODUCTS

A. Variable Frequency Drive (VFD) Motor Speed Controller (Confirm with Mechanical Contractor)
   1. Variable frequency drive and motor shall provide full motor nameplate rated horsepower as scheduled with no derating and shall be UL 508 listed.

2. The controller shall be furnished in a NEMA-1 enclosure and be configured as a motor starter and shall contain, in a single cabinet or frame, the following VFD components:
    a. Input fused disconnect
    b. Output thermal motor overloads
    c. Output relays (2)
    d. Output contactor
    e. 3 phase input line reactor (3%)
3. VFD shall contain a 3-contactor bypass or 2-contactor bypass to line circuitry in the same cabinet as the VFD components. Electronic bypass is accepted.
4. VFD shall contain circuitry to automatically restart after input power outage. This circuitry shall be contained in the same cabinet as the VFD components.
5. The variable frequency controller shall convert 460 VAC, +10% (unless otherwise scheduled on the drawings), three phase, 50/60 hertz utility power to variable voltage/frequency, three phase A-C power pulse width modulation for motor speed control. The drive shall have one minute rating of 110% of rated current. The controller shall be of the pulse width modulated (PWM) type.
6. The variable frequency controller shall have two sections as follows:
    a. Converter:
        (1) Modularized three phase, full wave, half control thyristor bridge
        (2) D-C Choke
        (3) Filter Capacity Assembly
        (4) Module Fan
    b. Inverter:
        (1) Three identical output power modules.
7. The variable frequency controller shall have the following basic functions:
    a. Start/stop and speed selection.
    b. VFD Auto/Manual Bypass/Off .
    c. Auto operation VIA 4 to 20 mA and 0 to 10 VDC control systems.
    d. Jog.
    e. Linear timed acceleration and deceleration.
    f. 10:1 Controlled speed range (6-60 HZ).
    g. Minimum and maximum adjustable speed set limits.
    h. Manual operation: Turn POT to adjust output.
    i. Digital display of output frequency, voltage, current. No percentage readings are acceptable.
8. The variable frequency controller shall have the following protective devices and/or features:
    a. Input magnetic circuit breaker.
    b. A-C overload function which continuously monitors output current and shuts down D-C module gate signals if motor current exceeds 225% of controller full load current rating.
    c. D-C bus disable is a multi-activated monitoring function which shuts down the gate drive to the D- C module effectively disabling the D-C module and reducing the A-C output voltage to zero. The D-C disable ramps the controller down to a standby frequency whenever any of the conditions occur which activate the D-C disable is activated under the following protective trip conditions:
        (1) Low input line voltage.
        (2) A-C overload.
        (3) D-C current trip.

(4) Loss of input or output phase.

d. Test points for each power module phase.
e. NEMA-1 Construction.
f. Peak load rating of 225% of rated current for ten seconds.
g. Current limited acceleration.
h. Voltage limited deceleration.
i. Auto/Bypass/Off hardware selector switch with run 'Auto' and run 'Manual' pilot lights.

9. The variable frequency controller shall have the following adjustable controls:
   a. Volts/Hertz
   b. Voltage Boost
   c. Acceleration
   d. Deceleration
10. The three phase 3% impedance input line reactor shall be provided to minimize drive harmonics on the AC line and protect the drive from damaging electrical system transients.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install variable frequency controllers where indicated on drawings.

B. Install per manufacturer’s written instructions.

C. Provide adequate space around the VFD for ventilation.

END OF SECTION 16265

SECTION 16289

SURGE PROTECTIVE DEVICE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work required under this Division shall include all materials, labor and auxiliaries required to furnish and install complete surge protective device (SPD) for the protection of building electrical and electronics systems from the effects of line induced transient voltage surge and lightning discharge as indicated on drawings and specified in this Section.

B. Related work specified elsewhere:
1. Section 16050 Basic Electrical Requirements.
2. Section 16129 Conduit and Raceways.
3. Section 16100 Building Wire and Cable.
4. Section 16128 Boxes.

1.2 QUALITY ASSURANCE

A. All surge protective device (SPD) devices shall be manufactured by a company normally engaged in the design, development, and manufacture of such devices for electrical and electronics systems equipment.

B. The SPD manufacturer shall offer technical assistance through support by a factory representative and local stocking distributor.

C. Submittals: SPD submittal shall include:
1. Schematic data on each suppressor type indicating component types.
2. Dimensioned drawing of each suppressor type.
3. Manufacturer's performance data for each suppressor type.
4. Manufacturer shall furnish complete maintenance and installation manuals and a list of replacement parts.
5. The manufacturer shall certify that their SPD device has been designed and tested to fail in a safe, non-violent mode with no smoke, fire, flame, case, or module physical damage.
6. Manufacturer shall provide independent third party test data confirming unit will not have any holdover current.
7. Manufacturer shall submit the cover page of the manufacturer’s UL Test Report to show compliance with UL 1449, Third Edition.

D. Equipment Certification: Items shall be listed by Underwriters' Laboratories, shall bear the UL seal and be marked in accordance with referenced standard U.L. 1449, Third Edition. Protection modes shall be as follows: seven (7) modes Wye = L-N, L-G, N-G; six (6) modes Delta = L-G, L-L.

E. SPD devices shall be installed and located in accordance with requirements of all applicable National Fire Protection Association (NFPA) Codes.

F. Manufacturer shall have a minimum of ten (10) years experience in the design, development, and manufacture of SPD equipment and a minimum of one (1) year experience with the technology being submitted and installed in the field.

1.3 WARRANTY

A. All Surge Protective Device shall be warranted for a minimum period of ten (10) years with free replacement of the device by the Manufacturer if the device fails to perform for any reason within those ten (10) years. Replacement shall be interpreted to include parts and shipping costs only.

B. It is the intent that failed devices shall be replaced at no cost to Owner throughout the 10-Year Warranty period.

1.4 CODES AND STANDARDS

A. The following standards and publications are referenced in various parts of this specification and shall apply.
   1. UL 1449, Third Edition—Surge Protective Device.
   2. ANSI/IEEE C62.41-1991 (IEEE 587)—Guide for Surge Voltages in Low-Voltage AC Power Circuits.
   3. ANSI/IEEE 62.11-1987—Standard for Testing Heavy Duty Service Entrance Surge Arrestor.
   4. ANSI/IEEE C62.45-1992—IEEE Guide for Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.
   5. UL 1283—Standard for Electromagnetic Interference Filters.

1.5 REQUIRED SUPPRESSORS

A. Provide U.L. SPD for the equipment described herein and as indicated on the drawings:
   1. On electrical service entrance panels.
   2. On distribution and branch circuit panels as noted on the drawing.

PART 2 - PRODUCTS

2.1 SPD FOR ELECTRICAL SERVICE ENTRANCE PANELS, SECONDARY PANELS, OR BRANCH PANELS

A. SPD shall be installed at the service entrance on the line side of the first main disconnect.

B. SPD shall be installed as close as feasible to the device being protected in a position which will minimize lead length between suppressor and the buses or control breaker to which the suppressor connects. SPD shall not extend beyond the SPD manufacturer's recommended maximum lead length without specific approval of the Engineer.

C. SPD shall be designed for the specific type and voltage of electrical service and shall provide clamping action for line to neutral, line to ground, and neutral to ground.

D. SPD shall be designed to withstand a maximum continuous operating voltage of not less than 125% of nominal RMS line voltage for 120V and 115% of nominal RMS line voltage for 277V.

E. The SPD shall be life cycle tested as per ANSI/IEEE 62.45-1992 to withstand 1,000 test surges at 10 KA for service entrance devices and 1,000 test surges at 3 KA for all other applications without failure or degradation of UL 1449 clamp voltages by more than 10%.

F. SPD shall be UL 1449, Third Edition, listed for all specified suppression modes and shall be approved for the location in which they are installed.

G. Suppressors shall have an operating temperature range of -10 degrees C to +50 degrees C.

H. Provide visible/audible or redundant visible alarm systems to indicate when the unit is operable and when it has failed. The alarm system shall be provided for each coupling mode.

I. Suppressors shall be marked with their short circuit current rating as per 2011 NEC and shall be rated as such to comply with the minimum A.I.C. rating of the service gear and or panelboard in which the SPD is to be installed.

2.2 SPD CRITERIA: SUPPRESSORS SHALL MEET OR EXCEED THE FOLLOWING CRITERIA

A. Service Entrance (2 device types)
1. 120/208 Volt, 3 Phase, 4 Wire plus ground, Wye.
a. Minimum Single Impulse Current Rating: 75,000 amperes per coupling mode (8/20 US waveform).
b. Suppressors shall be failsafe, shall not holdover current, shall have repeated surge capability, shall be self-restoring, and shall be fully automatic.
c. The ANSI/IEEE C62.41.2—2002, Category B/'C Low' clamping voltage shall not exceed the following (not including any integral disconnects):

Voltage	L-N	N-G	L-G
120/208	750	750	750
277/480	1200	1200	1200

d. Where direct connections are not provided, terminals shall be provided for all of the necessary power, neutral, and ground connections. Each terminal shall accommodate a minimum wire size of #8 AWG.

B. Distribution and branch circuit panels:
1. 120/208 Volt, 3 Phase, 4 Wire plus ground, Wye (1 device type)
a. Minimum Single Impulse Current Rating: 50,000 amperes per coupling mode (8/20 US waveform).
b. Suppressors shall be failsafe, shall not holdover current, shall have repeated surge capability, shall be self-restoring, and shall be fully automatic.
c. The ANSI/IEEE C62.41.2-2002 Category B/'C Low' clamping voltage shall not exceed the following (not including any integral disconnects):

Voltage	L-N	N-G	L-G
120/208	750	750	750

d. Where direct connections are not provided, terminals shall be provided for all of the necessary power and ground connections. Each terminal shall accommodate a minimum wire size of #8 AWG.

2.3 ACCEPTABLE MANUFACTURERS

A. Atlantic Scientific.

B. Ditek Corporation.

C. Erico, Inc.

D. L.E.A. International.

E. Surge Suppression, Inc.

F Substitution: Not permitted.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTIVE DEVICE

A. SPD shall be installed as close as practical to the electric panel to be protected, consistent with available space.

B. SPD shall be installed in a neat, workmanlike manner. Lead dress shall be as short and as straight as possible and be consistent with recommended industry practices for the system on which these devices are installed.

C. Equipment shall be installed following manufacturer's recommendations and guidelines in compliance with NEC Article 280/250 for grounding and bonding; NEC Article 110-9 and 110-10 for overcurrent protection.

D. All SPSD devices specified in this specification section shall be designed and installed such that normal operation of the system shall not be impaired by the installation of these devices.

END OF SECTION 16289

SECTION 16411

DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Disconnect Switches.

B. Fuses.

C. Enclosures.

1.2 REFERENCES

A. ANSI/UL 198C—High-Intensity Capacity Fuses; Current Limiting Types.

B. ANSI/UL 198E—Class R Fuses.

C. FS W-F-870—Fuseholders (For Plug and Enclosed Cartridge Fuses).

D. FS W-S-865—Switch, Box, (Enclosed), Surface-Mounted.

E. NEMA KS 1—Enclosed Switches.

1.3 SUBMITTALS

A. Submit product data.

B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS—DISCONNECT SWITCHES

A. Square D.

B. General Electric.

C. Cutler Hammer.

D. Siemens.

D. Substitutions: Not Permitted.

2.2 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1; Type HD, FS W-S-865; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F- 870.

B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD, FS W-S-865; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle

interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA KS 1; Fabricate enclosure from stainless steel.
   1. Interior Dry Locations: Type 1.
   2. Exterior Locations: Type 3R.

D. All service disconnects shall be “Heavy-Duty Type.” General duty equipment is not acceptable.

2.3 ACCEPTABLE MANUFACTURERS—FUSES

A. Bussmann.

B. Gould-Schawmut.

C. Littelfuse Tracor.

D. Substitutions: Not Permitted.

2. 4 FUSES

A. Fuses 600 Amperes and Less: ANSI/UL 198E, Class J for feeders and transformer loads and Class RK 5 for motor loads. Dual element, current limiting, time delay, one-time fuse, 250 or 600 volt.

B. Interrupting Rating: 200,000 rms amperes.

C. Spare fuses shall be provided in the amount of 10% of each size and type of fuse installed; but, in no case, shall be less than three (3) spares for each different size and class of fuse being provided. Store in fuse cabinet of sufficient size to house all fuses (provided by Electrical Contractor), located by Onwer/Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches where indicated on drawings.

B. Install fuses in fusible disconnect switches.

C. Fuses and fuse holders shall be equipped with UL Class “R” rejection clips.

D. All fusible switches which contain current limiting fusing shall have UL Class “R” rejection clips.

E. Fuses shall be dual element and current limiting.

F. When using fuses of ratings 600 ampere and below, specify UL Class RK1 current limiting/time delay/dual element with 200,000 ampere interrupting capacity (AIC).

G. All fuses shall be by the same manufacturer.

H. All multi-pole breakers shall have factory installed common trip handle ties.

END OF SECTION 16411

SECTION 16421

ENCLOSED MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Manual Motor Starters.

B. Magnetic Motor Starters.

C. Combination Magnetic Motor Starters.

1.2 RELATED WORK

A. Section 16070 Supporting Devices.

1.3 REFERENCES

A. ANSI/NEMA ICS 6—Enclosures for Industrial Controls and Systems.

B. ANSI/UL 198E—Class R Fuses.

C. FS W-F-870—Fuseholders (For Plug and Enclosed Cartridge Fuses).

D. FS W-S-865—Switch, Box, (Enclosed), Surface-Mounted.

E. NEMA ICS 2—Industrial Control Devices, Controllers, and Assemblies.

1.4 SUBMITTALS

A. Submit shop drawings.

B. Indicate on shop drawings, front and side views of motor control enclosures with overall dimensions. Include conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.

C. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.

D. Submit manufacturers' instructions.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site.

B. Store and protect products.

C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle in accordance with manufacturer's written instructions.

1.7 SPARE PARTS

A. Keys: Furnish five (5) each to Owner.

B. Fuses: Furnish two (2) spare fuses of each type and rating installed to Owner. Leave spare fuses in equipment; the fuses are protecting.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS—MOTOR STARTERS

A. Square D.

B. General Electic.

C. Cutler Hammer.

D. Siemens.

E. Substitutions: Not Permitted.

2.2 MANUAL MOTOR STARTERS

A. Manual Motor Starter: NEMA ICS 2; (size as noted on drawings) AC general-purpose, Class A, manually operated, non-reversing full-voltage controller for induction motors rated in horsepower, with overload relay, red pilot light, and key toggle operator.

B. Fractional Horsepower Manual Starter: NEMA ICS 2; AC general-purpose, Class A, manually operated, 1 pole full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and key toggle operator.

C. Motor Starting Switch: NEMA ICS 2; AC general-purpose, Class A, manually operated, 1 pole full-voltage controller for fractional horsepower induction motors, without thermal overload unit, red pilot light, key toggle operator.

D. Phase Failure, Overvoltage, and Undervoltage Relays: Provide contacts and locking potentiometers with overvoltage or undervoltage adjustments and LED indicators.

E. Enclosure: ANSI/NEMA ICS 6; as noted on drawings.

2.3 MAGNETIC MOTOR STARTERS

A. Magnetic Motor Starters: NEMA ICS 2; AC general-purpose, Class A, magnetic controller for induction motors rated in horsepower. Provide with all accessories listed.

B. Full Voltage Starting: Non-reversing type.

C. Coil Operating Voltage: 120 volts, 60 Hertz. Coordinate other voltages with Controls Contractor prior to ordering. All control voltage shall be 120 volts or less.

D. Size: NEMA ICS 2; size as shown on drawings.

E. Overload Relay: NEMA ICS 2; electronic motor logic protection.

F. Enclosure: NEMA ICS 6; type as shown on drawings.

G. Combination Motor Starters: Combine motor starters with fusible switch disconnect in common enclosure.

H. Auxiliary Contacts: NEMA ICS 2; two field convertible contacts in addition to seal-in contact shall be provided.

I. Indicating Lights: NEMA ICS 2; RUN, green in front cover shall be provided.

J. Selector Switches: NEMA ICS 2; HAND/OFF/AUTO, locking type, in front cover shall be provided.

K. Relays: NEMA ICS 2. Provide as necessary for control functions.

L. Control Power Transformers: 120 volt secondary in each motor starter shall be provided.

M. Phase Failure, Overvoltage, and Undervoltage Relays: Provide contacts and locking potentiometers with overvoltage or undervoltage adjustments and LED indicators.

2.4 CONTROLLER OVERCURRENT PROTECTION AND DISCONNECTING MEANS

A. Fusible Switch Assemblies: NEMA KS 1; FS W-S-865; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F- 870. Designed to accommodate Class R fuses.

2.5 ACCEPTABLE MANUFACTURERS—FUSES

A. Bussmann.

B. Gould-Schawmut.

C. Littelfuse Tracor.

D. Substitutions: Not Permitted.

2.6 FUSES

A. Fuses: ANSI/UL 198E, Class RK5; dual element, current limiting, time delay, one-time fuse, 250 or 600 volt.

B. Interrupting Rating: 200,000 rms amperes.

C. Fusible units shall be equipped with UL Class “R” rejection clips.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install motor control equipment in accordance with manufacturer's instructions.

B. Motor starters supplied by the Electrical Contractor unless otherwise indicated.

C. Install fuses in fusible switches.

D. Select and install electronic motor logic overload relay protection in all motor starters to match installed motor characteristics.

E. Motor Data: Provide engraved nameplate, securely mounted on the door exterior, for each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

END OF SECTION 16421

SECTION 16423

CONTACTORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General Purpose Contactors.

B. Lighting Contactors.

1.2 REFERENCES

A. ANSI/NEMA ICS 6—Enclosures for Industrial Controls and Systems.

B. NEMA ICS 2—Industrial Control Devices, Controllers, and Assemblies.

C. ANSI/NFPA 70—National Electrical Code.

1.3 SUBMITTALS

A. Product Data: Include dimensions, size, voltage ratings, and current ratings.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.4 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of each contactor and indicate circuits controlled.

1.5 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include instructions for replacing and maintaining coil and contacts.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS—GENERAL PURPOSE CONTACTORS

A. Square D.

B. General Electric.

B. Cutler Hammer.

C. Siemens.

D. Substitutions: Not Permitted.

2.0 GENERAL PURPOSE CONTACTORS

A. Description: NEMA ICS 2, AC general purpose magnetic contactor.

B. Coil Voltage: 120 volts, 60 Hertz.

C. Poles: As scheduled.

D. Size: As scheduled.

E. Enclosure: ANSI/NEMA ICS 6, Type as required to meet conditions of installation.

2.3 MANUFACTURERS—LIGHTING CONTACTORS

A. Square D.

B. General Electric.

B. Cutler Hammer.

C. Siemens.

D. Substitutions: Not Permitted.

2.4 LIGHTING CONTACTORS

A. Description: NEMA ICS 2, magnetic lighting contactor.

B. Configuration: Mechanically held, 3 wire control.

C. Coil Voltage: 120 or 277 volts, 60 Hertz.

D. Poles: As indicated.

E. Contact Rating: Match branch circuit overcurrent protection, considering derating for continuous loads.

F. Enclosure: ANSI/NEMA ICS 6; type as required to meet conditions of installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions in a readily accessible location.

END OF SECTION 16423

SECTION 16430

METERING

PART 1 - GENERAL

1.1 WORK INCLUDED (VERIFY WITH UTILITY CO.)

A. INSTALL metal housing, meter sockets, service enclosures for meters, test blocks, and connections, required for utility metering, as indicated on the Drawings, and/or per Utility Company's regulations.

B. VERIFY all Local requirements with Utility Company and make required adjustments per Utility Company's directions.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. PRODUCTS of this Section to be listed by Underwriters' Laboratories.

1.3 SUBMITTALS

A. SUBMIT product data.

B. SUBMIT Manufacturer's installation instructions.

PART 2 - EXECUTION

2.1 INSTALLATION

A. INSTALL metering items in accordance with Manufacturer's instructions and Utility Company requirements.

END OF SECTION 16430

SECTION 16442

PANELBOARDS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Distribution Panelboards.

B. Branch Circuit Panelboards.

1.2 REFERENCES

A. FS W-C-375—Circuit Breakers, Molded Case, Branch Circuit and Service.

B. FS W-P-115—Power Distribution Panel.

C. NEMA PB 1—Panelboards.

D. NEMA PB 1.1—Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

E. NEMA PB 1.2—Application Guide for Ground-fault Protective Devices for Equipment.

1.3 SUBMITTALS

A. Submit shop drawings for equipment and component devices.

B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement, and sizes.

1.4 SPARE PARTS

A. Keys: Furnish five (5) each to Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS—PANELBOARDS

A. Square D.

B. General Electric

B. Cutler Hammer.

C. Siemens.

D. Substitutions: Not Permitted.

2.2 GENERAL

A. All panelboards and circuit breakers shall be fully rated for available fault current.

2.3 DISTRIBUTION PANELBOARDS

A. Panelboards: NEMA PB 1; bolted circuit breaker type.

B. Provide cabinet front with concealed trim clamps and hinged door with flush lock. Finish in manufacturer's standard gray enamel.

C. Provide panelboards with copper bus, ratings as scheduled on drawings. Provide copper ground bus in all panelboards.

D. Minimum Integrated Short Circuit Rating: As shown on drawings.

E. Molded Case Circuit Breakers: NEMA AB-3; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

F. Current Limiting Molded Case Circuit Breakers: NEMA AB-3, Federal Specification WC-375; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size Class RK-5 fuse.

2.4 BRANCH CIRCUIT PANELBOARDS

A. Branch Circuit Panelboards: NEMA PB1; bolted circuit breaker type.

B. Enclosure: NEMA PB 1; Type 1 or 3 R as shown on drawings.

C. Cabinet Size: 5-3/8 inches deep.

D. Provide flush or surface cabinet front with concealed trim clamps, concealed hinge, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus, ratings as scheduled on drawings. Provide copper ground bus in all panelboards.

F. Minimum Integrated Short Circuit Rating: as shown on drawings.

G. Molded Case Circuit Breakers: NEMA AB-3; bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on drawings.

H. Current Limiting Molded Case Circuit Breakers: FS W-C-375; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole.

Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size Class RK-5 fuse.

I. All multi-pole breakers shall have factory installed common trip handle ties.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install panelboards plumb [and flush with wall finishes], in conformance with NEMA PB 1.1.

B. Height: 6 feet 6 inches.

C. Provide filler plates for unused spaces in panelboards.

D. Provide typed circuit directory for each branch circuit panelboard by building and room FISH number, new or existing. Revise directory to reflect circuiting changes required to balance phase loads. Trace out all circuits in existing panelboards to indicate an accurate directory per new space changes and room numbers. Indicate type of load served.

E. Stub three (3) empty ¾" conduits and two (2) empty 1" conduits to accessible location above ceiling out of each recessed panelboard. Install duct tape in ends of conduits to prevent insects and rodents from entering panelboard.

F. Panelboards/switchboards shall be provided with a minimum of 20% spare spacing for future additions or as noted on the drawings.

G. All panelboards shall have built in locks and keys provided.

H. Load centers shall not be permitted.

I. Branch circuits/conductors originating from different panelboards shall not be in same raceway(s).

J. Panelboards shall not be used as raceways.

K. Install lightning surge protector per manufacturer's recommendations on all service entrances, as shown on drawings, and connect to ground bus.

3.2 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed ten percent (10%), rearrange circuits in the panelboard to balance the phase loads within ten percent (10%). Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION 16442

SECTION 16510

LUMINAIRES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Luminaires and Accessories.

B. Exit Signs.

C. Dimmers

D. Lamps.

1.2 RELATED SECTIONS

A. Section 16128 Boxes.

B. Section 16070 Supporting Devices.

1.3 REFERENCES

A. ANSI C78.379—Electric Lamps—Incandescent and High-Intensity Discharge Reflector Lamps—Classification of Beam Patterns.

B. ANSI C82.1—Ballasts for Fluorescent Lamps—Specifications.

C. ANSI C82.4—Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).

D. ANSI/NFPA 70—National Electrical Code.

E. ANSI/NFPA 101—Life Safety Code.

F. NEMA WD 6—Wiring Devices-Dimensional Requirements.

1.4 SUBMITTALS

A. Submit Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

B. Product Data: Provide dimensions, ratings, and performance data.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of each luminaire.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit Maintenance Data: Include replacement parts list.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five (5) years experience.

1.8 EXTRA MATERIALS

A. Furnish under provisions of Division 1.

B. The Electrical Contractor shall at Substantial Completion, inspect the work, replace all burned out or defective light bulbs, and provide three percent 3% of the total lamp count of spare lamps and ballasts to be left at site.

C. Provide two (2) of each plastic lens type installed.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Furnish products as specified on drawings.

B. Substitutions: as specified on drawings.

2.2 CEILING FANS

A. Shall not be allowed for interior applications. Prior approval required by Owner for exterior applications. For exterior applications, each ceiling fan shall be provided with a sealed motor, rust-resistant galvanized housing, stainless steel fasteners, and all-weather blades. Equipment shall be compliant with Underwriters' Laboratories (UL) for installation in damp or wet locations.

2.3 EXIT SIGNS AND BATTERY PACKS

A. Refer to Luminaries schedule for requirements

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate and supporting grids for luminaires.

B. Examine each luminaire to determine suitability for lamps specified.

C. General lighting shall be utilized for emergency lighting when emergency power is provided by a generator set.

3.2 INSTALLATION

A. General
1. Install in accordance with manufacturer's instructions.
2. Support all luminaires independent of ceiling framing.
3. Install accessories furnished with each luminaire.
4. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaires.
5. Bond products and metal accessories to branch circuit equipment grounding conductor.
6. Fixture whips shall be steel or aluminum. M/C cable shall be permissible for fixture whips/connections. M/C cable shall not be used for branch circuit wiring. Fixture whips/connections shall be made with a minimum of #14 AWG copper conductors.
7. Each light fixture shall be individually connected with its own fixture whip. Looping between light fixtures shall not be permissible. Equipment grounding conductors shall be provided in all fixture whips and/or connections.
8. All fixture whips shall be supported to fixture support wire/cable with an approved fastener equal to an Erico "KX" flexible conduit hanger or other UL listed supports and fasteners.

B. Specific Lighting Types
1. Troffer and Lay-In Fixtures (for Support Devices reference Section 16190)
   a. Lay-in light fixtures shall be connected by flexible raceways (6' maximum) from a J-box.
   b. Fixtures are not to be used as a raceway unless stamped for use as raceway by manufacturer. Single fixture in lay-in ceilings shall not be used for raceway and shall be connected to an outlet box located within six feet (6') of fixture with flexible conduit or fixture whips.
2. Surface Mounted Fixtures (for Support Devices reference Section 16190)
   a. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
3. Pendant Mounted/Suspended Fixtures (for Support Devices reference Section 16190)
   a. Install pendant mounted/suspended luminaires plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
4. Recessed Fixtures (for Support Devices reference Section 16190)
   a. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
   b. Install recessed luminaires to permit removal from below.
   c. Install recessed luminaires using accessories and fire-stopping materials to meet regulatory requirements for fire rating.
5. Wall Mounted Fixtures (for Support Devices reference Section 16190)
   a. Install wall mounted luminaires at height as indicated on drawings.
6. Exit Signs (for Support Devices reference Section 16190)

a. Install exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
b. Install exit signs at height as indicated on drawings.

3.3 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Aim and adjust luminaires, as directed.

B. Adjust exit sign directional arrows, as indicated.

3.5 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosure.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and touch up damage.

3.6 DEMONSTRATION

A. Provide minimum of two (2) hours demonstration of luminaire operation.

3.7 WARRANTY

A. Lamps and ballast shall be warranted as a combination installation for a minimum of five (5) years for the ballast and three (3) years for lamps from the date of final Substantial Completion.

END OF SECTION16510

SECTION 16530

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes exterior luminaries, and accessories.

1.2 SUBMITTALS

A. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.

B. Product Data: Submit dimensions, ratings, and performance data.

C. Samples: Submit two color chips 3 x 3 inch in size illustrating luminaire finish color where indicated in luminaire schedule.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.4 MAINTENANCE MATERIALS

A. Furnish two of each lamp installed.

B. Furnish two ballasts of each lamp type installed.

PART 2 - PRODUCTS

2.1 LUMINARIES

A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled.

2.2 FLUORESCENT BALLASTS

A. Manufacturers:
1. Cooper Industries Inc.
2. Duro-Test Corp.
3. General Electric Co.
4. Hubbell Lighting
5. Magnetek Inc.
6. Pass & Seymour
7. Philips Electronic North America
8. Thomas Industries, Inc.
9. Substitutions: Permitted.

B. Product Description: High-power-factor type electromagnetic ballast certified by Certified Ballast Manufacturers, Inc. to comply with ANSI C82.1, suitable for lamps and environmental conditions specified, with voltage to match luminaire voltage.

2.3 HIGH INTENSITY DISCHARGE (HID) BALLASTS

A. Manufacturers:
1. Duro-Test Corp.
2. General Electric Corp.
3. Philips Electronic North America.
4. Radiant Lamp Co.
5. Siemens Corp.
6. Venture Lighting International Inc.
7. Substitutions: Permitted.

B. Product Description: ANSI C82.4, mercury vapor metal halide low pressure sodium high pressure sodium lamp ballast, suitable for lamp specified, with voltage to match luminaire voltage.

2.4 HID LAMPS

A. Manufacturers:
1. Duro-Test Corp.
2. General Electric Corp.
3. Philips Electronic North America
4. RCS Industries Co.
5. Siemens Corp.
6. Substitutions: Permitted

2.5 FLUORESCENT LAMPS

A. Manufacturers:
1. Duro-Test Corp.
2. General Electric Co.
3. Hubbell Inc.
4. Philips Electronics
5. Siemens Corp.
6. Substitutions: Permitted.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lighting fixtures as indicated on drawings.

B. Install lamps in each luminaire.

C. Bond and ground luminaries, metal accessories in accordance with Section 16060.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

B. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.3 CLEANING

A. Clean surfaces as recommended by manufacturer.

B. Clean finishes and touch up damage.

3.4 PROTECTION OF FINISHED WORK

A. Relamp luminaries having failed lamps at Substantial Completion.

END OF SECTION 16530

SECTION 16552

SERVICE ENTRANCE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Arrangement with Utility Company for permanent electric service including payment of Utility Company charges for service.

B. Underground Service Entrance.

1.2 SYSTEM DESCRIPTION

A. System Voltage: 120/208 volts, three phase, four-wire, 60 Hertz.

1.3 QUALITY ASSURANCE

A. Utility Company: TECO.

B. Install service entrance in accordance with Utility Company's rules and regulations.

PART 2 - PRODUCTS (NOT APPLICABLE)

2.1 NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

A. Make arrangements with Utility Company to obtain permanent electric service to the Project.

B. Underground: Install service entrance conduits and feeders from the transformer location to building service entrance equipment. Install primary conduits and coordinate routing.

C. The Electrical Contractor shall pay all costs incurred.

D. Furnish and install concrete pad in a suitable size in accordance with Utility Company's requirements, if not provided by the Utility Company.

E. This Contractor shall be responsible for the coordination of fencing around transformers. If fencing is not indicated, this Contractor shall provide.

F. All electrical service and distribution equipment shall be located indoors.

H. Service entrance raceways shall have a minimum burial depth of 36" to top of raceway.

I. Service Entrance Raceways shall have a yellow marker tape installed above its entire length placed approximately 12" below the finished grade.

END OF SECTION 16552

SECTION 16620

EMERGENCY GENERATOR SYSTEM

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes standby emergency engine-generator system.

B. Related Sections:
1. Section 16625.1 – Automatic Transfer Switch (ATS-EM)
2. Section 16625.2 – Automatic Transfer Switch (ATS-S)

1.2 SCOPE OF WORK

A. This Section covers the work necessary for a natural gas/LP fueled engine power generating system, complete. Furnish all necessary labor, materials, equipment, tools, services, incidentals, and perform operations required to into operation, and field test the specified weather protective enclosed pipeline natural gas/LP fueled engine driven generator unit and all related systems and appurtenances for a complete working system in place.

B. These Specifications are intended to give a general description of what is required, and do not necessarily cover all details which may vary in accordance with the specified requirements of the equipment to be furnished. It is, however, intended to cover the furnishing, the shop testing, delivery, complete installation and field testing of all materials, equipment, and appurtenances for provision of a complete and properly operating natural gas fueled standby emergency power generator and electrical power transfer system.

C. It is the intent of these Specifications that there is a single source of supply and responsibility for the entire specified engine generator system. Due to the coordination required between the related systems, the engine generator supplier shall be the responsible party and supply the entire engine generator equipment system, less site installation materials and installation related services and labor to be furnished by the Installing Contractor.

D. The engine generator (EG) system shall be fully automatic and shall constitute a complete, unified, and coordinated alternative electric standby power system ready for operation. Provide labor, materials, equipment, tools, and services, and perform operations required for, and reasonably incidental to, the providing separate and independent complete standby engine-generator systems consisting of new Industry standard pipeline natural gas/LP fuel operated engine electric standby power duty generator sets installed within outdoor aluminum weather protective sound attenuated enclosures for selectable automatic and manual starting, running, and stopping, including provision of generator equipment accessory equipment and generator automatic transfer equipment for use with electrical power transfer operations with the Facility electrical loads. The complete EG system normal operation shall not be required to be momentarily electrically paralleled with the electric Utility during any transfer or running operations

E. This Specification defines requirements for the emergency standby generator system, which shall be provided for completely automatic operation. System

voltage shall be Level 1, emergency generator 120 / 208 Volts AC, 3 phase, 4 wire, 60 Hz, at 0.8 power factor. The generator system starting and control logic shall be powered by the generator sets' starting / control batteries. The EG system normal operation shall not be required to be electrically paralleled with the electric Utility during any electrical transfer or running operations.

F. The Contractor shall be responsible for all costs and services as required for the complete installation and interface of the furnished EG system equipment with the remote transfer, annunciation, and communications equipment, and all other EG system accessory equipment as required for proper operation of the engine generator system.

G. The standby engine-generator system to be furnished by the engine generator supplier shall include, but not necessarily be limited to, the following basic components for each of the furnished generator set units:
1. Engine
2. Engine governing system
3. Generator
4. Generator set control panel
5. Generator automatic voltage regulator
6. Engine-mounted radiator closed loop cooling system
7. Exhaust system with specified attenuation grade silencer
8. Generator starting/control battery and automatic battery charger
9. Generator set vibration isolators
10. Engine-generator set accessories
11. Generator outdoor aluminum weather protective sound attenuated enclosure
12. Generator set and enclosure steel frame base
13. Remote annunciator panel Level 1
14. Generator automatic transfer switches.

1.3 SYSTEM DESCRIPTION

A. Each standby engine-generator set shall be identical and shall be the manufacturer's standard production model nameplate rated to have a minimum Factory rating and site capability of standby duty operation at 180 KW at 0.80 power factor, 120/208 Volt AC, 3-phase, 4-wire, 60 hertz.

System Function
1. The furnished engine generator set (EG) shall include the capability of being automatically controlled for start, run, and stop by the generator set connected automatic transfer switch equipment furnished by the engine generator supplier. After starting, the generator set shall attain proper speed and voltage in order to begin accepting transfer to electrical loads. Generator set speed shall be controlled by the engine governing and fuel control systems, while generator output voltage regulation shall be a function of the generator automatic voltage regulator. Manual adjustment controls for generator voltage shall be provided on the generator control panel.

B. Generator System Operational Parameters
1. The engine generator set when operated on industry standard pipeline natural gas/LP furnished to the generator set by the Installing Contractor and shall be capable of providing the generator set's rated electrical power under the specified performance criteria. An automatically

controlled natural gas/LP rated piping fuel inlet solenoid valve shall be furnished on the generator set by the generator set manufacturer.

C. Site Conditions

1. The operating environment of the standby engine-generator systems shall be:

Altitude, Sea level up to maximum	100 ft	
Outdoor temperature, maximum	105 °F	
Outdoor temperature, minimum	10 °F	
Engine jacket water, glycol mixture percentage		50/50
Installation type	inside of a weather	protective enclosure
Fuel type	Industry standard pipeline natural gas/LP	
Cooling system type	....unit mounted radiator with blower fan	
Exhaust system	inside generator outdoor	enclosure

D. System Performance

1. The standby engine-generator system shall conform to the following general performance criteria:
   a. Rating Engine brake horsepower shall be sufficient to deliver full rated engine-generator set KW/KVA when operated at rated rpm and equipped with all engine mounted parasitic and external loads.
   b. Each of the furnished generator sets shall be peak rated as defined in ISO 8528-3.

1.4 REFERENCE STANDARDS

A. The standby engine-generator set shall be designed, manufactured, and tested in accordance with the latest edition of the specific component manufacturers governing standards in effect at the time of equipment bid. The design, manufacture, assembly and operation of all elements of the engine generator system shall be furnished as specified herein and in accordance with, but not limited to, the latest published standards, guidelines, codes, and requirements of the following:

1. American Society of Mechanical Engineers (ASME)
2. Electrical Generating Systems Association (EGSA)
3. International Electro-technical Commission (IEC)
4. International Standards Organization (ISO)
5. Institute of Electrical and Electronics Engineers (IEEE)
6. National Electrical Code (NEC)
7. National Electric Manufacturers Association (NEMA)
8. National Fire Protection Association (NFPA) standards
9. Occupational Safety and Health Administration (OSHA)
10. Society of Automotive Engineers (SAE)
11. United States Military Standards for Generators and Controls (MIL STD)
12. American Welding Society (AWS)
13. Underwriters Laboratories (UL) (including UL2200 for generator sets and UL2200 for outdoor generator enclosures)
14. NFPA 110, Emergency and stand by power. The Generator shall meet all requirements for level 1 system.

1.5 QUALITY ASSURANCE

A. Each of the complete engine generator sets and outdoor weather protective enclosures and related systems and accessories shall be provided by one

vendor, thus assuring that the responsibility for performance to this Specification and equipment responsibility shall not be divided among individual suppliers, but shall be assumed solely by one primary vendor. The complete provision and performance responsibility for the furnished engine generator system equipment shall be assumed solely by one primary vendor who shall directly deliver, service, test, commission, and warranty all of the furnished generator sets. The vendor shall be the engine generator manufacturer's factory authorized direct distributor physically located in Florida, who maintains complete local sales, parts, and service facilities and provision in the field of electric power generation on direct behalf of the manufacturer of the engine generator set to be furnished, including factory trained mechanics and technicians and engine generator replacement parts for the generator set supplied. The generator set supplier shall be located within one hundred (100) miles of the Project site location. Generator set distributors or vendors based or located outside of this perimeter area, second level manufacturer's sub-dealers, or equipment redistribution suppliers do not comply with this requirement and shall not be accepted.

B. The complete engine-generator set including mounting base and radiator shall be a standard and current production model as required by these Specifications, of a Manufacturer regularly engaged in the design and production of this type of equipment. The unit to be furnished shall be of proven ability and shall be designed, constructed, and installed in accordance with best practices and methods in order to achieve and provide optimal physical and operational performance. To qualify as a Manufacturer, the engine must be the principal item manufactured and the completed engine generator set shall be assembled and tested by the Manufacturer prior to Factory shipment as specified herein.

C. It is the intent of this Specification to secure and install a natural gas/LP fueled electric standby emergency generator system that has been prototype tested, factory built, production and site tested, together with all accessories necessary for a complete installation as shown on the Plans and Drawings, and as indicated in the Specifications. The equipment, as supplied and installed shall meet the requirements of the NEC, the standards and codes as listed herein and all applicable state and local codes and regulations. The generator set, generator set enclosure and automatic transfer switch shall be supplied by a single generator set equipment supplier so that there is one-source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.

D. All system components shall have been designed to achieve optimum physical and performance compatibility and prototype tested to prove proper integrated design and operational capability. The complete open package generator set shall be designed, built, and assembled as a complete unit by the engine manufacturer, shall be complete in all respects, and shall include all equipment and controls necessary for a fully operational alternative electric power supply.

E. The generator set supplier must be the engine generator set manufacturer's factory authorized direct distributor, physically located in Florida, must maintain no less than 75% of all generator set replacement parts available at all times, and must maintain service facilities with service and parts personnel available to the Owner on a 24-hour / 365 day basis. Proof of this requirement shall be provided by the generator supplier and included in the Shop drawing submittals. Inspection of the generator supplier's local sales and service facility may be made by the Engineer in order to substantiate these mandatory requirements.

1.6 SUBMITTALS

A. Submit eight (8) bound copies of Shop Drawing Submittals to include engine generator system product data, technical information, and detailed mechanical, electrical and structural drawings indicating Specification and Drawing compliance for all furnished equipment, including operations, performances, interfaces, and services as required and as specified herein.

B. Engine-Generator Set
1. Component List: A breakdown of all components and options.
2. Technical Data: Manufacturer's specifications and data sheets identifying make and model of the engine generator set package and accessory equipment.
   a. Engine
      1) Type, aspiration, compression ratio, and combustion cycle
      2) Bore, stroke, displacement, and number of cylinders
      3) Engine speed (RPM)
      4) Break Horsepower rating (BHP)
      5) Brake Mean Effective Pressure (BMEP)
      6) Engine lubricating oil capacity
      7) Engine coolant capacity with radiator
      8) Radiator air flow and maximum allowable ventilation restriction
      9) Combustion air flow
      10) Exhaust air flow a maximum allowable restriction
   b. Generator Design
      1) Model
      2) Frame
      3) Insulation class
      4) Number of leads
      5) Excitation type
      6) Stator type
      7) Stator winding pitch
      8) Temperature rise at nameplate KW rating
      9) Telephone Influence factor (TIF)
      10) Telephone Harmonic factor (THF)
      11) Waveform distortion (THD)
   c. Generator technical data
      1) Full load efficiency
      2) Reactance, sub-transient direct axis (X"D)
      3) Reactance, transient saturated (X'D).
      4) Reactance, synchronous direct axis (XD).
      5) Reactance, negative sequence (X2).
      6) Reactance, zero sequence (X0).
      7) Time constants (T'D, T"D, T'DO, and TA).
      8) Motor starting capability in KVA
      9) Generator cooling air flow (CFM)
   d. Radiator
      1) Model
      2) Type
      3) Fan and motor data
      4) Coolant capacity, radiator
      5) Coolant capacity, radiator and engine
      6) Radiator air flow
      7) Radiator ambient capability

e. Major System Equipment (generator set, outdoor weather protective enclosure including accessory equipment):
   1) Dimensions
      a) Length
      b) Width
      c) Height
   2) Weight
      a) Dry
      b) Wet

3. Rating and performance is based on pipeline natural gas fuel supply having a Low Heat Value (LHV) of 905 Btu/cu ft and 80 MIN at 77 Deg. F ambient, and with a 0+ 5% fuel tolerance allowance.
   a. Power (BHP, KW, and KVA) rating at 0.8 power factor
   b. Standard condition fuel consumption in SCF/Hr at: 50 % load, 75 % load, 100% load operation
   c. Combustion air inlet flow rate
   d. Exhaust gas flow rate
   e. Exhaust stack temperature
   f. Exhaust system backpressure (maximum allowable)
   g. Exhaust emissions data at varying loads
4. Auxiliary Equipment specifications, data sheets, and drawings including, but not necessarily limited to, generator set vibration isolators, engine governor, generator voltage regulator, automatic battery charger, batteries, jacket water heater, exhaust muffler, exhaust flex, generator enclosure mounted generator set engine cooling radiator, generator outdoor weather protective enclosure, remote generator status/alarm annunciation panel, and generator automatic transfer switch equipment.
5. Drawings: Dimensional drawings showing overall complete engine-generator set, outdoor enclosure, locations of all interconnection points for AC power load leads, AC service requirements, all DC control and remote annunciation interfaces. Identify locations for all lubricating oil, exhaust, and crankcase fumes disposal, and cooling systems fluid drains. Provide equipment installation mounting locations and information.
6. Wiring Diagrams: Wiring diagrams, schematic diagrams and control panel outline drawings published by the manufacturer for engine-generator set controls, automatic transfer switch, and remote annunciator panel equipment showing all interconnection points and logic diagrams for interface wiring use by the installing Contractor and the Owner.
7. Warranty Statements Warranty verification published by the respective manufacturers of the component equipment.
8. Service Location and description of generator supplier’s parts and service facility including parts inventory and number of qualified generator set service personnel.

1.7 SERVICE AND WARRANTY

A. The generator set supplier shall be capable of providing factory-trained servicemen, the required stock of replacement parts, technical assistance, and complete equipment warranty administration.

B. Warranty Administration
   1. The generator set supplier shall be capable of, and be solely responsible for the direct implementation and administering the engine, generator, and all other generator set equipment components manufacturer's

warranties. Subcontracting or rerouting of these services by the generator supplier to other entities is not acceptable.

C. Warranty Terms

1. The generator sets shall be furnished with the engine generator set manufacturer's standard warranty. The furnished engine-generator set warranty shall be time based on a limitation of two (2) calendar years (twenty-four (24) months) from the date of initial start up of each of the generator set and shall include general costs during normal working hours for repair parts, labor, reasonable travel expenses necessary for equipment repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair.

D. Maintenance and Repair Contract

1. The engine-generator set supplier shall be capable of offering an optionally available maintenance and repair contract to the Owner which guarantees all support costs of the specified system. It shall include routine and 24 hour emergency access to the generator equipment supplier's service dispatch personnel in order to expedite emergency service and repairs, including parts replacement availability.

PART 2 – PRODUCTS

2.1 ACCEPTABLE GENERATOR SET MANUFACTURERS

A. Kohler (Basis-of Design)

B. Caterpillar

C. Cummins

D. Generac

E. Substitutions: Not Permitted.

2.2 EQUIPMENT

A. The generator set shall be a Kohler model 180REZXB with a 4S12X alternator. It shall provide 180kW/225 kVA when operating at 120/208 volts, 60 Hz, .8 power factor. The generator set shall be capable of a Standby 130°C rating while operating in an ambient condition of less than or equal to 105° F and a maximum elevation of 656 feet above sea level.

B. Motor starting performance and voltage dip determinations shall be based on the complete generator set. The generator set shall be capable of supplying 428 LRKVA for starting motor loads with a maximum instantaneous voltage dip of 35%, as measured by a digital RMS transient recorder in accordance with IEEE standard 115. Motor starting performance and voltage dip determination that does not account for all components affecting total voltage dip i.e. engine, alternator, voltage regulator and governor will not be acceptable. As such, the generator set shall be prototype tested to optimize and determine performance as a generator set system.

C. Vibration isolators shall be provided between the engine-alternator and heavy-duty steel base.

2.3. ENGINE

A. The minimum 537-cubic-inch displacement engine shall deliver a minimum of 227 HP at a governed engine speed of 1800 rpm, and shall be equipped with the following:

i. Electronic isochronous governor capable of 0.5% steady-state frequency regulation.

b. 12-volt positive-engagement solenoid shift-starting motor.

i. 70-ampere automatic battery charging alternator with a solid-state voltage regulation.

ii. Positive displacement, full-pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.

c. Dry-type replaceable air cleaner elements for normal applications.

i. Engine-driven or electric fuel-transfer pump including fuel filter and electric solenoid fuel shutoff valve capable of lifting fuel.

ii. The engine shall have a minimum of 8 cylinders and be liquid-cooled by Unit Mounted Radiator 122°F/50°C.

2.4. ALTERNATOR

A. The alternator shall be salient-pole, brushless, 2/3-pitch, 12 lead, self-ventilated with drip-proof construction and amortisseur rotor windings and skewed for smooth voltage waveform. The ratings shall meet the NEMA standard (MG1-32.40) temperature rise limits. The insulation shall be class H per UL1446 and the varnish shall be a fungus resistant epoxy. Temperature rise of the rotor and stator shall be limited to Standby 130°C. The excitation system shall be of brushless construction controlled by a solid-state voltage regulator capable of maintaining voltage within ±2.0% at any constant load from 0% to 100% of rating. The AVR shall be capable of proper operation under severe nonlinear loads and provide individual adjustments for voltage range, stability and volts-per-hertz operations. The AVR shall be protected from the environment by conformal coating. The waveform harmonic distortion shall not exceed 5% total RMS measured line-to-line at full rated load. The TIF factor shall not exceed 50.

B. The alternator shall have a single maintenance-free bearing, designed for 40000 hour B10 life. The alternator shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

C. The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current-support devices.

2.5. CONTROLLER

A. Decision-Maker® 550 Controller

1. The generator set controller shall meet NFPA 110 Level 1 requirements and shall include an integral alarm horn as required by NFPA.
2. The controller shall meet NFPA 99 and NEC requirements.
3. The controller shall be UL 508 listed.
4. Controller shall have a key switch to meet local code requirements and shall be removable only in the AUTO position.

B. Applicability
1. The controller shall be standard on a 180REZBX.
2. The controller shall support 12-volt starting systems.
3. The controller's environmental specification shall be: -40°C to 70°C operating temperature range and 5-95% humidity, non-condensing.
4. The controller shall mount on the generator or remotely within 40 feet with viewable access.

C. Hardware Requirements
1. Control Panel shall include:
   a. The control shall have a run-off/reset-auto three-position selector switch.
   b. A controller-mounted, latch-type emergency stop pushbutton.
   c. Five indicating lights: System Ready – green; Not in Auto – yellow; Programming Mode – yellow; System Warning – yellow; System Shutdown – red.
   d. Display with two lines of 20-alphanumeric characters, viewable in all light conditions.
   e. Sixteen position snap action sealed keypad for menu selection and data entry.
   f. For ease of use, an operating guide shall be printed on the controller faceplate.
   g. An audible alarm with alarm silence capability.
   h. Panel lights shall be supplied as standard.

D. Control Functional Requirements
1. Field-programmable time delay for engine start. Adjustment range 0-5 minutes in 1 second increments.
2. Field-programmable time delay engine cooldown. Adjustment range 0-10 minutes in 1 second increments.
3. Capability to start and run at user-adjustable idle speed during warmup for a selectable time period (0-10 minutes), until engine reaches preprogrammed temperature, or as supported by ECM-equipped engine.
4. The idle function including engine cooldown at idle speed.
5. Real-time clock and calendar for time stamping of events.
6. Output with adjustable timer for an ether injection starting system. Adjustment range, 0-10 seconds.
7. Output for shedding of loads if the generator set reaches a user programmable percentage of its kW rating. Load shed shall also be enabled if the generator set output frequency falls below 59 Hz.
8. Programmable cyclic cranking that allows up to six (6) crank cycles and up to 35 seconds of crank time per crank cycle.
9. The capability to reduce controller current battery draw, for applications where no continuous battery charging is available. The controller vacuum fluorescent display should turn off automatically after the controller is inactive for 5 minutes.
10. Control logic with alternator protection for overload and short circuit matched to each individual alternator and duty cycle.

11. Control logic with RMS digital voltage regulation. A separate voltage regulator is not acceptable. The digital voltage regulator shall be applicable to single- or three-phase systems.
12. The capability to exercise the generator set by programming a running time into the controller. This feature shall also be programmable through the PC software.
13. Control function shall include output voltage adjustment.
14. Battle switch function selection to override normal fault shutdowns, except emergency stop and overspeed shutdown.
15. The control shall detect the following conditions and display on control panel:
    a. Customer programmed digital auxiliary input ON (any of the 21 inputs available)
    b. Customer programmed analog auxiliary input out of bounds (any of 7 inputs for ECM equipped engines and 5 inputs for non ECM engines)
    c. Emergency stop
    d. High coolant temperature
    e. High oil temperature
    f. Controller internal fault
    g. Locked rotor - fail to rotate
    h. Low coolant level
    i. Low oil pressure
    j. Master switch error
    k. NFPA common alarm
    l. Overcrank
    m. Overspeed with user-adjustable level, range 60-70 Hz
    n. Overvoltage with user adjustable level, range 105% to 135%
    o. Overfrequency with user adjustable level, range 102% to 140%
    p. Underfrequency with user adjustable level, range 80% to 90%
    q. Undervoltage with user adjustable level, range 70% to 95%
    r. Coolant temperature signal loss
    s. Oil pressure gauge signal loss.

Conditions resulting in generator warning (generator will continue to operate):

1. Battery charger failure
2. Customer programmed digital auxiliary input on (any of the 21 inputs available)
3. Customer programmed analog auxiliary input on (any of the 7 inputs available on ECM engines and 5 inputs for non ECM engines)
4. Power system supplying load
5. Ground fault detected - detection by others
6. High battery voltage - Level shall be user adjustable
7. Range 29-33 volts for 24-volt systems
8. High coolant temperature
9. Load shed
10. Loss of AC sensing
11. Under-frequency
12. Low battery voltage - level shall be user adjustable, range 20-25 volts for 24-volt systems
13. Low coolant temperature
14. Low fuel level or pressure
15. Low oil pressure
16. NFPA common alarms
17. Overcurrent

18. Speed sensor fault
19. Weak battery
20. Alternator protection activated.

E. Control Monitoring Requirements
1. All monitored functions must be viewable on the control panel display.
2. The following generator set functions shall be monitored:
   a. All output voltages - single phase, three phase, line to line, and line to neutral, 0.25% accuracy
   b. All single phase and three phase currents, 0.25% accuracy
   c. Output frequency, 0.25% accuracy
   d. Power factor by phase with leading/lagging indication
   e. Total instantaneous kilowatt loading and kilowatts per phase, 0.5% accuracy
   f. kVARS total and per phase, 0.5% accuracy
   g. kVA total and per phase, 0.5% accuracy
   h. kW hours
   i. A display of percent generator set duty level (actual kW loading divided by the kW rating).
3. Engine parameters listed below shall be monitored: (*available with ECM equipped engines)
   a. Coolant temperature both in English and metric units
   b. Oil pressure in English and metric units
   c. Battery voltage
   d. RPM
   e. Lube oil temperature*
   f. Lube oil level*
   g. Crankcase pressure*
   h. Coolant level*
   i. Coolant pressure*
   j. Fuel pressure*
   k. Fuel temperature*
   l. Fuel rate*
   m. Fuel used during the last run*
   n. Ambient temperature*
4. Operational records shall be stored in the control beginning at system startup.
   a. Run time hours
   b. Run time loaded hours
   c. Run time unloaded hours
   d. Number of starts
   e. Factory test date
   f. Last run data including date, duration, and whether loaded or unloaded
   g. Run time kilowatt hours.
5. The following operational records shall be a resettable for maintenance purposes:
   a. Run time hours
   b. Run time loaded hours
   c. Run time unloaded hours
   d. Run time kilowatt hours
   e. Days of operation
   f. Number of starts
   g. Start date after reset.

6. The controller shall store the last one hundred generator set system events with date and time of the event.
7. For maintenance and service purposes, the controller shall store and display on demand the following information:
    a. Manufacturer's model and serial number
    b. Battery voltage
    c. Generator set kilowatt rating
    d. Rated current
    e. System voltage
    f. System frequency
    g. Number of phases.

F. Inputs and Outputs
1. Inputs
    a. There shall be 21 dry contact inputs that can be user-configured to shut down the generator set or provide a warning.
    b. There shall be 7 user-programmable analog inputs for ECM-equipped engines (5 for non-ECM engines) for monitoring and control.
    c. Each analog input can accept 0-5 volt analog signals.
    d. Resolution shall be 1:10,000.
    e. Each input shall include range settings for 2 warnings and 2 shutdowns.
    f. All values shall be on the control panel display.
    g. Shall be user-assigned.
    h. Additional standard inputs required:
        1) Input for an external ground fault detector. Digital display shall show "ground fault" upon detection of a ground fault.
        2) Reset of system faults.
        3) Remote two-wire start.
        4) Remote emergency stop.
    i. Idle mode enable.
2. Outputs
    a. All NFPA 110 Level 1 outputs shall be available.
    b. Thirty outputs shall be available for interfacing to other equipment:
        1) All outputs shall be user-configurable from a list of 25 functions and faults.
        2) These outputs shall drive optional dry contacts.
3. A programmable user-defined common fault output with over 40 selections shall be available.

G. Communications
1. If the generator set engine is equipped with an ECM (engine control module), the controller shall communicate with the ECM for control, monitoring, diagnosis, and meet SAE J1939 standards.
2. Industry standard Modbus communication shall be available.
3. A Modbus master shall able to monitor and alter parameters, and start or stop a generator.
4. The controller shall have the capability to communicate to a personal computer (IBM or compatible) running Windows ’9X or Windows NT.
5. Communications shall be available for serial, CAN, and Ethernet bus networks.
6. A variety of connections shall be available based on requirements:
    a. A single control connection to a PC.
    b. Multiple controls on an intranet network connected to a PC.

c. A single control connection to a PC via phone line.
d. Multiple controls to a PC via phone line.

7. Generator and transfer switch controls shall be equipped with communications modules capable of connecting to the same communication network.
8. The capability to connect up to 128 controls (any combination of generator sets and transfer switches) on a single network shall be supported.
9. Cabling shall not be limited to the controller location.
10. Network shall be self-powered.

H. Communications
1. If the generator set engine is equipped with an ECM (engine control module), the controller shall communicate with the ECM for control, monitoring, diagnosis, and meet SAE J1939 standards.
2. Kohler proprietary RBUS communication shall be available.
3. A RBUS shall be able to monitor and alter parameters, and start or stop a generator.
4. The controller shall have the capability to communicate to a personal computer (IBM or compatible) running Windows XP, or Windows 7 or later.
5. A variety of connections shall be available based on requirements:
a. A single control connection to a PC via USB
b. Internet connection via Ethernet.
6. Generator and transfer switch controls shall be equipped with communications modules capable of connecting to the same communication network.

2.6. ACCESSORIES

A. Air Restriction Indicator. The air cleaner restriction indicator shall indicate the need for maintenance of the air cleaners.

B. Battery Charger. A 10-ampere automatic float to equalize battery charger with the following features:
1. 12 or 24 VDC output
2. Voltage regulation of 1% from no to full load over 10% AC input line voltage variations
3. Ammeter and voltmeter with 5% full-scale accuracy
4. LED lamp for power indication
5. Current limited during engine cranking, short circuit, and reverse polarity conditions
6. Temperature compensated for ambient temperatures for -40°C to 60°C
7. UL Listed.

C. Battery Rack and Cables. Battery rack and battery cables capable of holding the manufacturer's recommended batteries shall be supplied.

D. Critical Silencer. The engine exhaust silencer shall be temperature and rust resistant, and rated for critical applications. The silencer will reduce total engine exhaust noise by 25-35 db(A).

E. CIRCUIT BREAKER
1. Provide two (2) generator mounted UL Listed main line, solid-state trip, three-pole generator output circuit breaker for the purpose of providing an

AC electrical load circuit interrupting and protection device on the generator. The circuit breaker shall be an LSI unit of the 150A and 500 A (amperage) size. The circuit breaker's electronic trip current sensors shall monitor each phase It shall have adjustable long time and long time delay during overload conditions, instantaneous magnetic tripping for short circuit protection, adjustable short time and short time delay features. Generator exciter field circuit breakers do not meet this requirement and are not acceptable in lieu of the generator mounted circuit breaker.

2. The circuit breakers shall have adjustable electronic long time, short time and instantaneous trip unit. A generator DC battery control voltage operated circuit breaker shunt trip coil shall be furnished to automatically trip open the circuit breaker concurrently with the occurrence of any generator set fault or emergency shutdown condition or monitoring detection of an event that could cause catastrophic failure of the generator.
3. The circuit breakers shall be furnished with a minimum of one (1) set of circuit breaker installed auxiliary circuit breaker open/close status dry contacts for remote signal annunciation purposes.
4. Provide a generator neutral conductor bus bar arrangement inside of the generator mounted circuit breaker enclosure connected to the generator neutral leads. The circuit breakers and generator neutral bar assembly shall be furnished with mechanical lugs suitable for proper connections with the quantities and sizes of the Installing CONTRACTOR furnished generator AC power conductors / conduits as shown on the Contract Drawings. AC power cable and conduit entry into the generator for connection to the circuit breaker shall be from the bottom.

F. Wireless monitor.
1. MONITORING SYSTEM SHALL MEET THE SPECIFICATIONS BELOW:
   a. Operating temperature range: -40o to 60oC (-40o to 140oF)
   b. Storage temperature range: -40o to 70oC (-40o to 160oF)
   c. Humidity range: 5-95% non-condensing
   d. Enclosure: NEMA type 4
   e. Power supply: 85-120 VAC @ 60 Hz
   f. Voltage input rating: 24-120 VAC or 5-48 VC
   g. Standards: UL2017 listed for General Purpose Signaling Devices and Systems.
2. Hardware requirements:
   a. Unit must have the following light emitting diode (LED) indicators and display.
      1) Yellow to indicate service ready, transmitting message, or no service.
      2) Green to indicate successful message transmission, waiting to transmit, or no service.
      3) Red to indicate active input (must be viewable above each input when panel is removed).
      4) A red numeric display to indicate signal strength of cellular transmission or service mode. Numeric display shall also be capable of verifying network communicates operation.
   b. Unit must have RJ type phone jack connections if used with Modbus communication.
   c. Unit must have an antenna with a weather-resistant connector.
   d. Unit shall have a service button to verify on-site response.

e. Unit shall have an alarm silence button to silence audible alarms and provide diagnostic codes.
f. Unit shall be capable of both dry contact and voltage inputs.
1) Dry contacts (4 inputs) for connection to a generator set controller (apply no voltage).
2) Voltage sensing (3 or 4 inputs) for connection to equipment voltage outputs.
3) Relay contacts that can be activated via password protected web interface for remote stop/start or reset function.
g. DIP switches establish criteria for selected inputs: enable/disable remote start/stop, enable/disable audible alarm, normally open/closed input, and AC power supply select.
h. The unit shall be equipped with DIP switches to select remote start/stop and input functions (NO/NC).
i. Unit shall have accessories available for mounting antenna external to unit.

3. Communications requirements:
a. The monitor shall be a transmitter and use wireless radio technology. Any other type of technology is not acceptable.
b. Monitor shall send alarms output over the Global Systems for Mobile (GSM).
c. The monitor shall provide 24/7 monitoring of the equipment connected.
d. All activity shall be viewable via an Internet web page.
e. The unit shall allow selectable outputs, which must include all available fault alarms from the generator controller.
f. Unit must be capable of providing remote start/stop functions.
g. The delivery method to alert recipients most include: cell phone, pager (alphanumeric and numeric), fax, XML-based messaging voice-mail, or e-mail.
h. All records of equipment operation must be available on a password-protected web site.
i. Password shall be user-selectable.
j. All messages have to be reported in text format with time and date stamps identifying target recipient.
k. All alarm messages, targeted recipients, and delivery methods shall be able to be configured and changed directly by user using a password-protected web interface.
l. Message delivery status must be confirmed as successful or failed.
m. All messages must contain the alarm condition, equipment make/model, and equipment location.
n. Alarm records, heartbeats, and runtimes must be maintained for 90 days.
o. The monitor must scan for alarm messages every 2-3 seconds.
p. Unit must provide the web-based database with daily records of the generator runtimes.
q. The monitor must send a heartbeat message every 24 hours with system information to confirm operation - device failure results in unit failed to report heartbeat alarm message.

G. Duct Flangers. A radiator duct flange to provide a convenient connection to duct work for the radiator discharge air shall be included.

H. Failure Relay.

1. The common failure relay shall remotely signal auxiliary faults, emergency stop, high engine temperature, low oil pressure, overcrank, and overspeed via one single-pole, double-throw relay with 10 amps at 120 VAC contacts.
2. The relay contacts shall be gold flashed to allow use of low current draw devices (100ma @28 VDC min.).
3. Once energized the relay shall remain latched until the system is reset by the main controller switch.

I. Flex Exhaust Tube. The exhaust piping shall be gas proof, seamless, stainless steel, flexible exhaust bellows with threaded NPT connection.

J. Generator Heater. The generator heater shall prevent the accumulation of moisture and dampness in the generator windings. The heater shall be wired on at all times.

K. Monitor III Software.
1. A single software package with the following capabilities is required:
   a. Monitor and control any combination of transfer switches and generator controls.
   b. Support up to 247 devices at a single site.
   c. Support communications over phone lines. The software shall allow communications with up to 247 sites (phone numbers) including phone number fields large enough for International communication.
   d. Password-protected data access to individual devices.
   e. Expandable to up to 247 devices without changing to a different software package.
2. All displays, data inquires, and program functions allowed on the controllers, both generator set and ATS, shall also be available through the software.
3. The software must be menu driven with separate menus for transfer switches and for generator set functions.
4. It shall be possible to reset shutdown faults, and restart the generator set using the software.

L. Rodent Guards. Generator rodent guards shall prevent intrusion and protect internal components.

M. RS232 Communications. Communications & Personal Computer Software
1. The controller must have the capability to communicate to a personal computer (IBM or compatible) running Windows ’9X or Windows NT.
2. Both RS-232 and RS-485 communication formats shall be available.
3. A variety of connections shall be available based on requirements:
   a) A single connection to a PC. A cable length of up to 1220 m (4000 ft) must be supported.
   b) Multiple devices at a single location connected to a PC.
   c) A single connection from a device to a PC over phone lines.
   d) Multiple devices to a PC over phone lines.
4. When equipped with communications modules, transfer switches and power monitors along with generator set controllers must be able to be connected to the same communication network with no additional interfaces being required.

5. The capability to connect up to 128 devices (generator set controls and transfer switches) on a single network must be supported.
6. Cabling is to be device to device in a daisy chain fashion with no limitation on device locations within the network.
7. The network must be self- powered. No power wiring between devices is allowed.
8. A single software package with the following capabilities is required:
   a) Any combination of transfer switches and generator set controls.
   b) Up to 128 devices at a single site must be supported.
   c) The same software package must support communications over phone lines. The software shall allow communications with up to 128 sites (phone numbers) including phone number fields large enough for International communication.
   d) Access to individual devices by the software shall be protected by password.
   e) To support future expansion, it must be possible to add devices (ATS and generator set controllers), up to 128 and sites up to 128, with the installed software. Changing to a different software package is not acceptable.
   f) All displays, data inquires, and program functions allowed on the controllers, both generator set and ATS, shall also be available through the software.
   g) A single software screen must be capable of displaying data from multiple devices simultaneously.
   h) It shall be possible to reset shutdown faults, and restart the generator set using the software.
   i) If a transfer switch is used, it must be possible to start the generator set and transfer the loads to the generator.

N. Run Relay. The run relay shall provide a three-pole, double-throw relay with 10-amp/250 VAC contacts to indicate that the generator is running. The relay provides three sets of dry contacts for energizing or de-energizing customer devices while the generator is running (e.g. louvers, indicator lamps, etc.)

O. Skid End Caps. The generator shall include skid end caps.

P. Heavy-Duty Air Cleaner. The air cleaner shall provide an engine air filter service in severe dusty and dirty operating conditions.

Q. 2 Input/5 Output Module. The 2 Input/5 Output Module kit provides two additional analog inputs and 5 additional dry contact outputs. The analog inputs can be used for analog or digital input functions. They can be set up for 0-5VDC, ±3VDC resistive or relay contact sensor devices. The dry contact outputs are arranged as two 120VAC or 28VDC, 10A from C contacts and three 28VDC, 2A form C contacts. Input and output functions are user defined using Site Tech software.

R. Block Heater. The block heater shall be thermostatically controlled and sized to maintain manufacturers recommended engine coolant temperature to meet the start-up requirements of NFPA 99 and NFPA 110, Level 1.

S. Prealarm Senders. The generator prealarm senders shall provide signals for local and/or remote annunciation for engine conditions approaching

critical/shutdown parameters required in NFPA 110. Prealarms warn of low water (engine) temperature, approaching low oil pressure, and approaching high engine temperature.

T. Remote Annunciator Panel. The remote annunciator shall meet NFPA 110, Level 1 requirements and enable remote viewing of the generator status. The panel shall be connected to the generator controller via either network communication wires or via hard wired connections. Options shall be available to provide ATS source position, loaded test, and retransfer. The panel shall have the capability to be either flush- mounted or surface-mounted. The annunciator shall meet UL508 requirements.

2.7 SOUND ENCLOSURE

A. All enclosures are to be constructed from high strength aluminum.

B. The enclosure shall be finish coated with powder baked paint for superior finish, durability and appearance. Enclosures will be finished in the manufacturer's standard color.

C. The enclosures shall allow the generator set to operate at full load in an ambient of 40°C - 45°C with no additional derating of the electrical output.

D. Enclosures shall be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear facing door is required. Access to the controller and main line circuit breaker must meet the requirements of the National Electric Code.

E. Doors must be hinged with stainless steel hinges and hardware and be removable.

F. Doors shall be equipped with lockable latches. Locks must be keyed alike.

G. The enclosure roof shall be pitched to prevent accumulation of water.

H. A duct between the radiator and air outlet shall be provided to prevent re-circulation of hot air.

I. The complete exhaust system shall be internal to the enclosure or optional with external mounted silencer.

J. All acoustical insulation shall be fixed to the mounting surface with pressure sensitive adhesive or mechanically fastened. In addition, all acoustical insulation mounted on a horizontal plane shall be mechanically fastened. The acoustical insulation shall be flame retardant.

K. The enclosures shall include an exhaust scoop to direct the cooling air in a vertical direction.

L. The enclosure design and construction must, as a minimum and as applicable, comply with the Florida Building Code (FBC) and shall bear the UL label “Commercial Building Classified by Underwriter’s Laboratories in Accordance with the National Electric Code”. The label shall also indicate compliance with

UL2200 for enclosures. The enclosure manufacturer shall indicate on the enclosure drawings that the enclosure is designed and constructed to withstand a constant wind load resistance up to 150 MPH, shall be capable of withstanding a 165 MPH wind speed gust for three (3) seconds, with Exposure C criteria as per ASCE 7- 05, and is designed and constructed to meet the missile impact requirements of the Florida Building Code, Sections no. 419 and 1626.2 through 1626.4. The Generator Enclosure shall reduce the total Generator noise level to 60 dBA at 12'-0".

M. The enclosure manufacturer shall provide all required hangars, supports, mounting materials and hardware for the generator exhaust silencer and exhaust piping installed inside of the enclosure. The exhaust muffler shall be integrally insulated by the exhaust silencer manufacturer. Provide high temperature rated insulation around the exhaust piping sections that are physically located inside of the generator enclosure. The exhaust muffler shall be shipped to the site installed by the enclosure manufacturer inside of the enclosure, located so as to be readily and properly connected to the engine's stainless steel exhaust flexible connector.

N. Provide one (1) DC powered light bulb installed within protective covered fixture and mounted on the interior roof of the enclosure above the generator's control panel, away from damaging heat, and secured against harmful vibrations. The light is to be connected to a manually operated automatic 0-60 minute timer switch, labeled "DC Light", installed inside the enclosure adjacent to the enclosure installed AC light switch. The DC light shall be appropriately fused and wired to the generator set's starting/control battery power in conduit by the enclosure manufacturer. The lights shall be large enough to provide adequate illumination for the generator control panel in an emergency situation yet not such that overburdening drain shall be placed on the generator set starting battery system.

O. Provide a minimum of four (4) dual tube fluorescent lights (32 W T8 (4) foot long lamps) with covers installed within the enclosure ,and strategically located on both sides, and the generator end of the generator set to provide a minimum of 40 foot-candles (fc) of uniform light throughout the enclosure. They shall be ceiling mounted and parallel to the length of the unit, properly secured against harmful vibrations. A light switch shall operate all of these fixtures and shall be located on the inside of the enclosure adjacent to the enclosure door located at the generator end of the enclosure. The light switch box shall have its own 20A rated, grounded duplex receptacle.

P. The enclosure manufacturer shall furnish, install, and wire the all specified enclosure accessory electrical items in the interior and on the exterior of the enclosure as indicted herein. All enclosure electrical equipment shall be installed and electrically wired and interconnected between the required equipment items. All electrical equipment and wiring systems shall be provided in accordance with National Electric Code (NEC) and National Fire Protection Association (NFPA) requirements, including proper clearance around all enclosure interior installed electrical equipment. All wiring will be in Rigid Metal or liquid-tight conduit utilizing compression fittings. All mechanical and electrical connections at the generator set shall be flexible.

Q. The enclosure manufacturer shall provide and install all necessary wiring and conduits from the enclosure interior installed AC power junction boxes to the enclosure and generator AC electrical equipment. Install all enclosure AC power

and control wiring as required for a complete and operating system. This includes, but not necessarily limited to the following AC service requirement items.

R. Provide generator pre-wired electrical panel 'G' - 100 Amps MCB, 1ph, 208V and connect all generator devices and equipment as heaters, charger, lighting, and receptacles to the panel.

PART 3 – EXECUTION

3.1 FACTORY TESTING AND INSPECTION

A. Engine-Generator Set

1. The engine-generator set manufacturer shall perform factory testing on each of the engine-generator sets provided. A Factory issued test report of these tests shall be submitted to the Owner's Representative upon delivery of the unit to the site.
2. The engine, generator, and engine-generator set shall be subjected to the factory testing and quality control inspections to insure reliable operation. These tests and inspections shall include, but not necessarily be limited to, the following:
   a. Factory testing at the generator set's nameplate power rating and power factor utilizing pipeline natural gas to confirm baseline data with recording of each of the following operational conditions for the tested generator set:
      1) Voltage (each of three phases and average)
      2) Amperage (each of three phases and average)
      3) KW output
      4) Power Factor
      5) Frequency
   b. The reactive load banks utilized for testing of the generator set at the factory shall not be dependent on the generator control instruments to read amperage and voltage on each phase. Rather, the test instrumentation shall serve as a check of the generator set meters.
   c. Copies of the factory test report for the furnished generator set shall also be included in the generator supplier furnished generator set equipment Parts, Operation and Maintenance manuals furnished by the generator supplier to the Owner.
3. Prior to delivery the engine-generator set shall be tested to show it is free of any defects and will start automatically and carry full rated load. This testing shall be performed at the generator set manufacturer's factory.
4. The testing shall be performed with load banks capable of definite and precise incremental loading. The testing shall be performed at the furnished generator set's rated load and at rated power factor.
5. All consumables necessary for Factory testing shall be furnished by the manufacturer. Any defects or operational deficiencies which become evident during the testing shall be corrected by the manufacturer at their own expense prior to shipment to the jobsite.

3.2 DELIVERY/INSPECTION

A. The Generator Vendor shall be responsible for the following:

1. Examine the area to receive the generator equipment to assure adequate clearances for all installations.

2. Check that the generator curb is mounted and support on the existing roof is level and free of irregularities.
3. Start work only after unsatisfactory conditions are corrected.
4. Ensure that the generator equipment will be properly protected and stored after site delivery.

3.3 SITE INSTALLATION

A. The generator equipment shall be installed as indicated on the drawings and per the manufacturer's recommended procedures and guidelines.

B. The generator supplier will be responsible for providing a field service technician to periodically oversee the Installing Contractor's installation of the system, including setting, alignment, assembly, and connections.

C. The engine-generator set vendor shall be responsible for providing the coordinating wiring diagrams showing the electrical interface connections between the generator paralleling switchgear and the engine-generator equipment for use by the Installing Contractor during installation and checkout of the equipment.

3.4 FIELD QUALITY CONTROL

A. The complete installation shall be checked for procedural and operational compliance by technical representatives of the engine-generator set supplier. Any observed or determined deficiencies shall be corrected by the Installing Contractor.

B. The generator supplier shall perform start up procedures, systems checks, adjusting, and site testing required after the installation is complete.

C. The engine lubricating oil and coolant conditioner, as recommended by the engine manufacturer, shall be provided by the generator supplier and installed in the furnished generator sets.

3.5 DELIVERY INSPECTIONS

A. The Installing Contractor shall examine and confirm that the site delivery areas to receive the generator system equipment is free of obstructions, debris, and moisture, and that adequate clearance for delivery, offloading, and installation of the generator system equipment is available at the time of generator equipment delivery.

B. The Installing Contractor shall confirm that the generator pad and support are, suitably sized, level, and free of irregularities.

C. The Generator Vendor shall examine and confirm that the site delivery areas to receive the generator system equipment is free of obstructions, debris, and moisture, and that adequate clearance for delivery, offloading, and installation of the generator system equipment is available at the time of generator equipment delivery.

D. Prior to generator system equipment site delivery, the generator supplier shall, as requested by the Installing Contractor, provide adequate information for the Installing Contractor's use in ensuring that all of the delivered generator system

equipment will be properly offloaded, rigged, cared for, protected, and stored by the Installing Contractor.

3.6 SYSTEM START-UP AND OPERATIONAL TESTING

A. The generator supplier's field service technician shall be responsible for field start-up and testing of the furnished generator equipment. The generator supplier shall furnish the Engineer with written certification assuring that each item of equipment is complete, in good condition, free from damage and properly installed, connected, and adjusted.

B. The Installing Contractor shall provide the required assistance to the generator supplier's field service technician during all phases of generator equipment start-up and testing. This assistance shall be limited to tasks directly associated with the installation of the generator equipment, not with the internal components or inherent function of the generator equipment.

C. Engine-Generator Pre-start Checks
1. Oil level
2. Water levels
3. Natural gas/LP supply piping and associated equipment installation, supply, and operation
4. Battery / charger connections and charge conditions
5. Engine to control interconnects
6. Engine-generator intake air/ discharge air obstructions
7. Exhaust system installation
8. Engine-generator enclosure ventilation obstructions
9. Radiator mounting and piping system
10. Removal of all packing materials
11. Generator equipment installation mounting.

D. The Installing Contractor shall verify and confirm that the pipeline natural gas/LP supply system equipment and piping is properly installed and required natural gas pressure and quantity is available for the generator set engine's operational use.

E. The generator supplier shall be responsible for the coordinated interface operation of the engine-generator equipment with the operation of the automatic transfer switch equipment and the generator remote annunciator status panel so that automatic operation of the complete emergency power system functions as described and required by these and other related Specifications.

F. Generator system site operational testing shall be performed by the generator supplier in coordination with the Installing Contractor.

G. Generator Site Operational Testing
1. The generator supplier shall provide and deliver to the site, temporary use, and dry type resistive load banks as necessary for temporary use in load bank testing of each generator set. The load bank shall be sized and furnished so as to have a minimum load testing capability of 100% of the generator set's nameplated KW rating. Building load shall not be used in conjunction with the generator system load bank testing. The Installing Contractor shall be responsible for connection and disconnection of the generator supplier furnished temporary use load

bank cables to the generator set and load bank equipment as necessary to perform the required site load bank testing.

2. Upon satisfactory preliminary site startup and operational testing of the generator sets by technical representatives of the generator supplier, each the generator sets shall be separately and sequentially load bank tested by the generator supplier in coordination with the Installing Contractors and the Engineer. The Installing Contractor shall ensure that adequate natural gas supply is available for all generator sets use during all site generator set startup, commissioning, and testing activities.

3. Site testing: The generator set shall be incrementally loaded until full load 100% generator set standby rating KW is achieved and operate sustained full load for four (4) continuous hours. The generator set shall be allowed to achieve voltage and frequency stabilization between sequential loading steps. Record the following readings in fifteen (15) minute intervals for the duration of the complete load bank testing period.
   a. Kilowatts
   b. Voltage (each of 3 phases)
   c. Amperage (each of 3 phases)
   d. Frequency
   e. Power factor
   f. Engine oil pressure, and water temperature
   g. Exhaust gas temperature (at engine exhaust outlet)
   h. Ambient outside air temperature
   i. Battery charging amperage rate
   j. Battery voltage
   k. Time at each recorded measurement.
4. Proper site installed generator control system operation, including proper manual and automatic electrical transfer operations shall be confirmed and demonstrated. Field verify proper operation of all generator controls, generator set alarms and shutdowns, safety devices, and remote annunciation.
5. The Installing Contractor shall ensure that all furnished equipment is properly cleaned and touched up if necessary to match original finishes prior to acceptance by the Owner.
6. The generator supplier shall provide three (3) copies of generator set test reports of the complete generator set field testing, after satisfactory completion of startup and testing of the generator set equipment. The certified generator equipment site testing documentation and reports must be compiled so as to indicate complete compliance with the specified generator system testing and operational requirements.

2.7 INSTALLATION, OPERATION AND MAINTENANCE MATERIALS

A. Installation Instructions

1. Provide two (2) copies of generator equipment storage, and installation instructions for all equipment and devices provided under this Contract for use during the installation and commissioning into service of the standby generator emergency power system. One (1) copy shall be provided to the Installing Contractor prior to the time of equipment site delivery. The other copy shall be issued to the Engineers for their reference during installation, start-up, and testing of the generator equipment.

B. Operation Instructions and Maintenance Manuals

1. After completion of work and start-up of the equipment at the project site, deliver to the Owner's Representative, two (2) copies of the generator set equipment Parts, Operation and Maintenance manuals and drawings presenting full details for operation, care, and maintenance of the furnished generator equipment.
2. Each manual shall contain the operating and maintenance information and parts breakdowns and lists for all equipment provided under this Contract. For all electrical components, provide wiring and connection diagrams. Manuals shall include instructions required to accomplish specified operation and functions. Data shall be neat, clean, legible copies.
3. In general the manual shall include, but not necessarily be limited to, the following:
    a. Operating Instructions with description and illustration of the engine-generator set, engine and generator controls and any other controls and indicators.
    b. Parts Books that illustrate and list all assemblies, subassemblies and components, except standard fastening hardware (nuts, bolts, washers, etc.).
    c. Preventative Maintenance Instructions on the complete system that cover daily, weekly, monthly, biannual, and annual maintenance requirements and include a complete lubrication chart.
    d. Troubleshooting information covering the complete engine-generator set showing description of trouble, probable cause, and suggested remedy.
    e. Recommended Spare Parts List showing all consumables anticipated to be required during routine maintenance and testing.
    f. Wiring Diagrams and Schematics.

2.8 ORIENTATION

A. The Installing Contractor and ATS supplier shall provide a complete orientation for the Owner. Training topics covered shall include complete generator system sequence of operations, control operations, schematics and wiring diagrams, metering, indicators, warning lights, alarm and shutdown systems, routine maintenance and troubleshooting procedures for all of the furnished generator system equipment. The Installing Contractor and ATS supplier shall furnish four hours of instruction to the owner.

END OF SECTION 16620

SECTION 16625.1

AUTOMATIC TRANSFER LOAD SWITCH (ATS-EM)

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes Automatic Transfer Load Switch.

B. Related Sections:
1. Section 16620 – Emergency Engine-Generator Engine

1.2 SCOPE OF WORK

Furnish and install bypass isolation switch (ATS/BPS) system(s) with 4 Pole - Switched Neutral [V], 150 Amps, 208 Volt-60Hz [C]. Each automatic transfer shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. All bypass isolation transfer switches and controllers shall be the products of the same manufacturer.

1.3 CODES AND STANDRARD

A. The bypass isolation switch and controls shall conform to the requirements of:
- UL 1008 - Standard for Transfer Switch Equipment
- IEC 947-6-1 Low-voltage Switchgear and Control gear; Multifunction equipment; Automatic Transfer Switching Equipment
- NFPA 70 - National Electrical Code
- NFPA 99 - Essential Electrical Systems for Health Care Facilities
- NFPA 110 - Emergency and Standby Power Systems
- IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- NEMA Standard ICS10-1993 (formerly ICS2-447) - AC Automatic Transfer Switches
- UL 508 Industrial Control Equipment
- CSA 22.2 No. 178 Certification

PART 2 - PRODUCTS

2.1 ACCEPTABLE GENERATOR SET MANUFACTURERS

A. Kohler (Basis-of Design)

B. Caterpillar

C. Cummins

D. Generac

E. Substitutions: Not Permitted

2.2 PRODUCT DESCRIPTION

A. Product rating

1. Automatic transfer switches & bypass isolation switches shall be Kohler Bypass/Isolation - Programmed Transition (KBP)/KBPDCVA0150B. Any alternate shall be submitted for approval to the consulting engineer at least 10 days prior to bid. Alternate bids must list any deviations from this specification.
2. The transfer switch shall have a 3 cycle withstand and closing rating of 50 KA at 480 Vac. Contractor shall provide a circuit breaker on panel DP2Y to achieve the required AIC Rating.
3. The voltage rating of the transfer switch shall be no less than the system voltage rating.
4. The transfer switch shall be UL Listed for application in the furnished enclosure for 100% for continuous duty and shall conform to the applicable requirements of UL 1008 for emergency system total load.
5. The automatic transfer switches shall be fully rated to protect all types of loads, inductive and resistive, from loss of continuity of power, without derating.

B. Mechanically Held Transfer Switch

1. The transfer switch shall be electrically operated and mechanically held and interlocked to prevent connection of the two sources. The electrical operator shall be a momentarily energized, solenoid mechanism. Main operators utilizing which include overcurrent disconnect devices, linear motors or gears shall not be acceptable. The switch shall be mechanically interlocked to ensure only three possible positions, normal, emergency, or off.
2. All transfer switch sizes shall use only one type of main operator for ease of maintenance and commonality of parts.
3. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.
4. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.
5. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 600 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.
6. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, which are not intended for continuous duty, repetitive switching or transfer between two active power sources, are not acceptable.
7. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor plate with fully rated AL-CU pressure connectors shall be provided.
8. Where neutral conductors must be switched as shown on the plans, the contactor shall be provided with fully rated switched neutral transfer contacts. Overlapping neutral contacts may be used as an alternative.

2.3 BYPASS-ISOLATION SWITCH

A. A two-way bypass-isolation switch shall provide manual bypass of the load to either source and Permit isolation of the automatic transfer switch from all source and load power conductors. All main contacts shall be manually driven.

B. Power interconnections shall be silver-plated copper bus bar. The only field installed power connections shall be at the service and load terminals of the bypass-isolation switch. All control interwiring shall be provided with disconnect plugs.

C. Separate bypass and isolation handles shall be utilized to provide clear distinction between the functions. Handles shall be permanently affixed and operable without opening the enclosure door. Designs requiring insertion of loose operating handles or opening of the enclosure door to operate are not acceptable.

D. Bypass to the load-carrying source shall be accomplished with no interruption of power to the load (make before break contacts). Designs which disconnect the load when bypassing are not acceptable. The bypass handle shall have three operating modes: "Bypass to Normal," "Automatic," and "Bypass to Emergency." The operating speed of the bypass contacts shall be the same as the associated transfer switch and shall be independent of the speed at which the manual handle is operated. In the "Automatic" mode, the bypass contacts shall be out of the power circuit so that they will not be subjected to fault currents to which the system may be subjected.

E. The isolation handle shall provide three operating modes: "Closed," "Test," and "Open." The "Test" mode shall permit testing of the entire emergency power system, including the automatic transfer switch with no interruption of power to the load. The "Open" mode shall completely isolate the automatic transfer switch from all source and load power conductors. When in the "Open" mode, it shall be possible to completely withdraw the automatic transfer switch for inspection or maintenance to conform to code requirements without removal of power conductors or the use of any tools.

F. When the isolation switch is in the "Test" or "Open" mode, the bypass switch shall function as a manual transfer switch.

G. Designs requiring operation of key interlocks for bypass isolation or ATS(s) which cannot be completely withdrawn when isolated are not acceptable.

2.4 CONTROLLER DISPLAY AND KEYPAD

A. A four line, 20 character LCD display and dynamic 4 button keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the communications interface port. The following parameters shall only be adjustable via a password protected programming on the controller (dip switches shall not be acceptable):

- Nominal line voltage and frequency
- Single or three phase sensing

- Operating parameter protection
- Transfer operating mode configuration (Open transition, Closed transition, or Delayed transition)

All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

2.5 VOLTAGE, FREQUENCY AND PHASE ROTATION SENSING

A. Voltage (all phases) and frequency on both the normal and emergency sources shall be continuously monitored, with the following pickup, dropout, and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter	Dropout/Trip	Pickup/Reset
Under voltage	75 to 98%	85 to 100%
Over voltage	105 to 135%	95 to 100% of trip
Under frequency	85 to 99%	95 to 99%
Over frequency	105 to 120%	101 to 105%
Voltage unbalance	5 to 20%	3% to 18%

B. Repetitive accuracy of all settings shall be within ± 0.5% over an operating temperature range of -20°C to 70°C.

C. An adjustable dropout time for transient voltage and frequency excursions shall be provided. The time delays shall be 0.1 to 9.9 seconds for voltage and .1 to 15 seconds for frequency.

D. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via the communications interface port.

E. The controller shall be capable of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or BAC). Unacceptable phase rotation shall be indicated on the LCD; the service required LED and the annunciation through communication protocol and dry contacts. In addition, the phase rotation sensing shall be capable of being defeated, if required.

F. The controller shall be capable of detecting a single phasing condition of a source, even though a voltage may be regenerated by the load. This condition shall be considered a failed source.

G. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage on all 3 phases (phase to phase and phase to neutral), frequency, and phase rotation.

2.6 Time Delays

A. An adjustable time delay of 0 to 10 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 12 or 24 VDC power supply.

B. A time delay shall be provided on transfer to the emergency source, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

C. A time delay shall be provided on re-transfer to normal. The time delays shall

be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

D. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

E. A time delay activated output signal shall also be provided to drive external relay(s) for selective load disconnect control. The controller shall be capable of controlling a maximum of 9 individual output time delays to step loads on after a transfer occurs. Each output may be individually programmed for their own time delay of up to 60 minutes. Each sequence shall be independently programmed for transferring from normal to emergency and transferring from emergency to normal.

The controller shall also include the following built-in time delays for the following operations:

- 0 to 60 minute time delay on failure to acquire the acceptable electrical parameters from the emergency source
- 0 to 60 minute time delay for a failure to synchronize on an in-phase operation.
- 60 minute time delay for the load disconnect position for delayed transition operation.

F. All time delays shall be adjustable in 1 second increments.

G. All time delays shall be adjustable by using the display and keypad or with a remote device connected to the communications interface port through a security-password system.

H. All time delays shall be adjustable by using the display and keypad or with a remote device connected to the communications interface port through a security-password system.

I. Each time delay shall be identified and a dynamic countdown shall be shown on the display.

J. A time delay shall be provided to delay the transfer while in the "off" position. The time delays shall be adjustable from 0 to 60 minutes.

2.7 ADDITIONAL FEATURES

A. The controller shall have 3 levels of security. Level 1 shall allow monitoring of settings and parameters only. The Level 1 shall be capable of restricted with the use of a lockable cover. Level 2 shall allow test functions to be performed and Level 3 shall allow setting of all parameters

B. Membrane-type switches shall be provided for the test functions and be maintained until the end test function is activated. The test function shall be allowed through password security. It shall be possible to defeat the password requirement by way of a circuit board, mounted dip switch setting. The test function shall be load, no load or auto test. The auto test function shall request an elapsed time for test. At the completion of this time delay the test shall be automatically ended and a retransfer sequence shall commence. All loaded tests shall be immediately ended and retransfer shall occur if the emergency

source fails and the normal source is acceptable.

C. A SPDT contact, rated 5 amps at 30 VDC, shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

D. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of two contacts, closed when the ATS is connected to the normal source and two contacts closed, when the ATS is connected to the emergency source.

E. LED indicating lights shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).

F. LED indicating lights shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal (green) and emergency sources (red), as determined by the voltage, frequency and phase rotation sensing trip and reset settings for each source.

G. A membrane switch shall be provided on the membrane panel to test all indicating lights and display when pressed.

H. Provide the ability to select “commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.

I. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which closes to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad or the communications interface port. A “not-in-auto" LED shall indicate anytime the controller is inhibiting transfer from occurring.

J. An in-phase monitor shall be a standard feature in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The in-phase monitor shall be specifically designed for and be the product of the ATS manufacturer. The in-phase monitor shall be capable of being enabled or disabled from the user interface.

K. The controller shall be capable of accepting two separate external normally open contacts that will allow the functions described in the “input". In addition, the controller shall have two separate “C" form contacts that will function as described in the “output". The controller shall be capable of expanding the number of inputs and outputs with additional modules.

- The controller interface modules shall communicate with the transfer switch controller by way of I^2 C communications bus.

- An optional input/output module shall be furnished which mounts on the inside of the enclosure to facilitate ease of connections. The modules shall provided with form "C" contact outputs rated for up to 12A @ 240VAC or 2A

@ 480VAC that can be programmed from the following values:

- Common alarm events
- Contactor position
- Exercise active
- Failure to acquire standby source
- Failure to transfer
- I/O module fault
- Load bank control
- Load control active
- Loss of phase fault
- External battery fault
- Non-emergency transfer
- Over/under frequency
- Over/under voltage
- Peak shave active
- Phase rotation error
- Preferred source supplying load
- Source available
- Standby source supplying load
- Excessive synchronizing time
- Test active
- Transfer switch aux contact fault
- Voltage unbalance
- Not in automatic mode

- The module shall also have 2 inputs for external controls that can be programmed from the following values:

- Time delay bypass
- Battery fault
- Common fault
- Inhibit transfer
- Load shed to force to the Off position
- Peak shave
- Test
- Three source system disable

L. *Engine Exerciser* - The controller shall provide an internal engine exerciser. The engine exerciser shall allow the user to program up to 21 different exercise routines based on a calendar mode. For each routine, the user shall be able to:

- Enable or disable the routine.
- Enable or disable transfer of the load during routine.
- Set the start time.
  time of day
  day of week
  week of month (1st, 2nd, 3rd, 4th, alternate or every)
- Set the duration of the run.
  At the end of the specified loaded exercise duration the switch shall transfer the load back to normal and run the generator for the specified cool down period. All loaded exercises shall be immediately ended and retransfer shall occur if the standby source fails. The next exercise period shall be displayed on the main screen with the type of exercise, time and date. The type of exercise and the time remaining shall be display when the exercise is active. It shall be possible of ending the exercise event with a single button push.

M. *Date and time* - The date shall automatically adjust for leap year and the time shall have the capability of automatically adjusting for daylight saving and standard times.

N. *System Status* - The controller shall have a default display the following on:

- System status
- Date, time and type of the next exercise event
- Average voltage of the preferred and standby sources

Scrolling through the displays shall indicate the following:

- Line to line and line to neutral voltages for both sources
- Frequency of each source
- Load current for each phase
- Single or three phase operation
- Type of transition

- Preferred source
- Commit or no commit modes of operation
- Source/source mode (Utility/Gen; Gen/Gen; Utility/Utility)
- In phase monitor enable/disable
- Phase rotation
- Date and time

O. Controllers that require multiple screens to determine system status or display “coded" system status messages, which must be explained by references in the operator’s manual, are not permissible.

P. *Self Diagnostics* - The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

Q. *Communications Interface* - The controller shall be capable of interfacing, through a standard communications with a network of transfer switches and generators. It shall be able to be connected via an RS-485 serial communication (up to 4000 ft. direct connect or multi-drop configuration), an Ethernet connectivity (over standard 10baseT Ethernet networks utilizing a RJ-45 port or remotely utilizing a dial-up modem). This module shall allow for seamless integration of existing or new communication transfer devices and generators. Monitoring software shall allow for the viewing, control and setup of parameters of the genset and transfer switch network through a standard personal computer utilizing current Microsoft operating systems. Separate and specific transfer switch software interfaces shall not be acceptable.

R. The transfer switch shall also be able to interface to 3rd party applications using Modbus RTU and Modbus TCP/IP open standard protocols utilizing Modbus register maps. Proprietary protocols shall not be acceptable.

S. The controller shall contain a USB port for downloading the controller’s parameters and settings; exercise event schedules; maintenance records and event history. The file designator shall be the unique serial number of the transfer switch.

T. *Data Logging* - The controller shall have the ability to log data and to maintain the last 2000 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory. The controller shall be able to display up to the last 99 events. The remaining events shall be downloadable to be displayed on a computer.

- Event Logging
  Data, date and time indication of any event.
- Statistical Data
  Total number of transfers.*
  Total number of fail to transfers.*
  Total number of transfers due to preferred source failure.*
  Total number of minutes of operation.*
  Total number of minutes in the standby source.*
  Total number of minutes not in the preferred source*
  Normal to emergency transfer time
  Emergency to normal transfer time

System start date
Last maintenance date

* The statistical data shall be held in two registers. One register shall contain data since start up and the second register shall contain data from the last maintenance reset.

U. *External DC Power Supply* - An optional provision shall be available to connect up to two external 12/24 VDC power supply to allow the LCD and the door mounted control indicators to remain functional when both power sources are dead for extended periods of time. This module shall contain reverse battery connection indication and circuit protection.

2.8 ENCLOSURE

A. The ATS shall be furnished in a NEMA 1 (A) enclosure.

B. All standard door mounted switches and long life super bright type indicating LEDs described in section 3 shall be integrated into a flush-mounted, interface membrane or equivalent in the enclosure door for easy viewing & replacement. The panel shall be capable of having manual locking feature to allow the user to lockout all membrane mounted control switches to prevent unauthorized tampering. This cover shall be mounted with hinges and have a latch that may be padlocked. The cover shall have the option of a “see-through" window to allow viewing indicating LEDs and display. The membrane panel shall be suitable for mounting by others when furnished on open type units.

2.9 TESTS AND CERTIFICATION

A. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

B. The ATS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

2.10 SERVICE REPRESENTATION

A. The manufacturer shall maintain a national service organization of employing personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

2.11 ACCESSORIES

A. Alarm Module. The alarm module shall be 90dB audible alarm; any alarm function can be programmed to trigger the audible alarm, with external alarm

connection. The audible alarm can be set to sound under selected fault conditions through setup on the user interface. The other options that can be activated with the alarm board are the Chicago alarm option, Preferred Source selection and the Supervised Transfer Control Switch.

B. Standard I/O Module. The standard I/O Module has two programmable inputs and six programmable outputs.

Inputs Available	2
Contact Closure	Contact Closure
Current	5mA Max.
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Max Distance	700 feet
Outputs Available	6
Contact Type	Form C (SPDT)
Contact Rating	2A @ 30VDC
	500mA @ 125VAC
Connection Type	Terminal Strip
Wire Size	#14-24 AWG

C. High Power I/O Module. The high power I/O Module has two programmable inputs and three programmable outputs.

Inputs Available	2
Contact Closure	Contact Closure
Current	5mA Max.
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Max Distance	700 feet
Outputs Available	3
Contact Type	Form C (SPDT)
Contact Rating	12A @ 24VDC
	12A @ 250VAC
	10A @ 277VAC
	2A @ 480VAC
Connection Type	Terminal Strip
Wire Size	#14-24 AWG

D. External Battery Supply Module. The external battery shall energize the ATS controls using an external battery when no source power is available, allow extended engine start time delays, the use of any combination of accessory modules, connect to one or two batteries, 12 VDC or 24 VDC, current draw, 140 mA @ 12 VDC, 86 mA @ 24 VDC, shall provide low external battery voltage indication to the transfer switch controller, and reverse-polarity protected.

E. Current Sensing. Current sensing shall measure the load bus current on all

phases with 1% accuracy. Load current shall be viewable on the controller LCD display.

G. Digital Meter. The digital meter shall be capable of setting and displaying voltage, current, frequency and power for both sources. Programmable visual alarms shall be standard for high and low voltage and high current. A serial, RS-485 port and two auxiliary contacts shall be standard. Programming menus shall be password protected.

H. Line to Neutral Monitoring. Line-to-neutral voltage monitoring shall allow the display of the AN, BN, and CN RMS voltages in the normal operation menus.

I. Logic Disconnect Switch. A Logic disconnect switch shall be mounted inside the enclosure, and shall disconnect power to controller without disconnecting the load. The logic disconnect switch shall disconnect utility power to the controller during maintenance and service without disconnecting power to the load. The switch has two positions, auto and disconnect. The disconnect position shall disconnect the voltage sensing leads for the utility source (A, B, C, N). It is assumed that the user shall disable the generator by placing the controller in the OFF position.

J. Padlockable User Interface Cover. The user interface cover shall protect the controller user interface from the environment. This shall be available with and without a viewing window. A Type 3R enclosure shall require the non-viewable option.

K. Seismic Certification. The seismic certification shall be available for 150-3000 amp switches with NEMA 1 enclosures. Certification shall depend on geographic location. Contact local distributor for details.

L. Supervised Transfer Control Switch. The supervised transfer control switch shall provide a door mounted, three position, selector switch with Auto, Manual and Transfer positions.

The alarm module shall be required in order to activate this option.

1. With the controller set to the automatic mode and the selector switch in the Auto position, the user transfer switch shall operate normally.
2. With the controller set to the automatic mode and the selector switch in the Manual position, the user shall be required to toggle the selector switch to initiate a transfer from the emergency to the normal position.
3. With the controller set to the non-automatic mode and the selector switch in the Manual position, the user shall be required to toggle the selector switch to the transfer position to initiate a transfer in either direction. In this mode, the ATS shall not automatically transfer to an acceptable source in the case of source failure, without the user toggling the selector switch to the transfer position.

M. Monitor III Software. Monitor III software shall provide the following:

1. Monitor and control the power system's generator sets and transfer switches from a personal computer using a single software package.
2. Monitor and control system through a Windows®-based graphical user interface.
3. Monitor and control systems over a local area network, remotely via a modern connection, or through an Ethernet connection.

4. Password-protected data access: Guest, User, and Supervisor levels
5. Ethernet capability
6. Start or stop a test from a remote PC
7. Assign inputs and outputs
8. View and adjust trip points, time delays, and system parameters
9. Available as loose kits:
    1. Software kit with serial code
    2. Software kit with modem and cables

N. Digital Meter. The digital meter shall be capable of setting and displaying voltage, current, frequency and power for both sources. Programmable visual alarms shall be standard for high and low voltage and high current. A serial, RS-485 port and two auxiliary contacts shall be standard. Programming menus shall be password protected.

O. Suppression, Transient Voltage Surge (TVSS) - A TVSS shall be provided for protection of the normal source supply. The TVSS shall be provided with a 30A circuit breaker disconnect to allow for replacement of the device without disconnecting the normal source supply. A 90dB audible alarm shall be provided as standard. A terminal block for remote contacts shall be provided for a Form C contact, rated at 3A, 120VAC, 60W DC. The TVSS shall provide L-L, L-N, L-G, and N-G lines shall be protected. LED status indicators shall be available on the face of the device to indicate operational state. The TVSS device shall be listed to UL 1449, Edition 3.

P. Heater, Anti-Condensation - An enclosure heater strip shall be supplied inside the transfer switch enclosure and shall be controlled by an adjustable humidistat. The humidistat shall be adjustable from 35% to 95% relative humidity, factory set at 65%. 120VAC power for the strip heater is to be provided by others. A 15A protective circuit breaker is provided. The heater option shall provide 125W or 250W, pending on the configured kit selection.

PART 3 – EXECUTION

3.1 FACTORY TESTING AND INSPECTION

A. All consumables necessary for Factory testing shall be furnished by the manufacturer. Any defects or operational deficiencies which become evident during the testing shall be corrected by the manufacturer at their own expense prior to shipment to the jobsite.

3.2 DELIVERY/INSPECTION

A. The Contactor and ATS supplier shall be responsible for the following;
    1. Examine the area to receive the ATS equipment to assure adequate clearances for all installations.
    2. Start work only after unsatisfactory conditions are corrected.
    3. Ensure that the ATS equipment will be properly protected and stored after site delivery.

3.3 SITE INSTALLATION

A. The ATS equipment shall be installed on the site by the Contractor as indicated on the drawings and per the manufacturer's recommended procedures and guidelines.

B. The ATS supplier will be responsible for providing a field service technician to periodically oversee the Installing Contractor's installation of the system, including setting, alignment, assembly, and connections.

C. The ATS set vendor shall be responsible for providing the coordinating wiring diagrams.

3.4 FIELD QUALITY CONTROL

A. The complete installation shall be checked for procedural and operational compliance by technical representatives of the ATS/engine-generator set supplier. Any observed or determined deficiencies shall be corrected by the Installing Contractor.

B. The ATS supplier shall perform start-up procedures, systems checks, adjusting, and site testing required after the installation is complete.

3.5 DELIVERY INSPECTIONS

A. The ATS supplier shall, as requested by the Installing Contractor, provide adequate information for the Installing Contractor's use in ensuring that all of the delivered ATS equipment will be properly offloaded, rigged, cared for, protected, and stored by the Installing Contractor.

B. The Installing Contractor shall be responsible to confirm that all unsatisfactory site conditions are corrected prior to scheduling ATS system equipment deliveries.

3.6 SYSTEM START-UP AND OPERATIONAL TESTING

A. The ATS supplier's field service technician shall be responsible for field start-up and testing of the furnished ATS equipment. The ATS supplier shall furnish the Engineer with written certification assuring that each item of equipment is complete, in good condition, free from damage and properly installed, connected, and adjusted.

B. The Installing Contractor shall provide the required assistance to the ATS supplier's field service technician during all phases of ATS equipment start-up and testing. This assistance shall be limited to tasks directly associated with the installation of the ATS equipment, not with the internal components or inherent function of the ATS equipment.

3.7 INSTALLATION, OPERATION AND MAINTENANCE MATERIALS

A. Installation Instructions: Provide two (2) copies of ATS equipment storage, and installation instructions for all equipment and devices provided under this Contract for use during the installation and commissioning into service of the ATS/standby generator emergency power system. One (1) copy shall be

provided to the Installing Contractor prior to the time of equipment site delivery. The other copy shall be issued to the Engineers for their reference during installation, start-up, and testing of the ATS equipment.

B. Operation Instructions and Maintenance Manuals

1. After completion of work and start-up of the equipment at the project site, deliver to the Owner's Representative, three (3) copies of the ATS set equipment Parts, Operation and Maintenance manuals and drawings presenting full details for operation, care, and maintenance of the furnished ATS equipment.
2. Each manual shall contain the operating and maintenance information and parts breakdowns and lists for all equipment provided under this Contract. For all electrical components, provide wiring and connection diagrams. Manuals shall include instructions required to accomplish specified operation and functions. Data shall be neat, clean, legible copies.
3. In general the manual shall include, but not necessarily be limited to, the following:
    a. Operating Instructions - with description and illustration of the ATS and controls and any other controls and indicators.
    b. Parts Books - that illustrate and list all assemblies, subassemblies and components, except standard fastening hardware (nuts, bolts, washers, etc.).
    c. Preventative Maintenance Instructions - on the complete system that cover daily, weekly, monthly, biannual, and annual maintenance requirements.
    d. Troubleshooting information - covering the complete ATS set showing description of trouble, probable cause, and suggested remedy.
    e. Recommended Spare Parts List - showing all consumables anticipated to be required during routine maintenance and testing.
    f. Wiring Diagrams and Schematics.

3.8 ORIENTATION

A. The Installing Contractor and ATS supplier shall provide a complete orientation for the Owner. Training topics covered shall include complete ATS system sequence of operations, control operations, schematics and wiring diagrams, metering, indicators, warning lights, alarm and shutdown systems, routine maintenance and trouble shooting procedures for all of the furnished ATS system equipment. The Installing Contractor and ATS supplier shall furnish four hours of instruction to the owner.

END OF SECTION 16625.1

SECTION 16625.2

AUTOMATIC TRANSFER SWITCH (ATS-S)

1.1 SCOPE OF WORK

A. Furnish and install bypass isolation switch (ATS/BPS) system(s) with 4 Pole-Switched Neutral [V], 400 Amps, 208 Volt-60Hz [C]. Each automatic transfer shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. All bypass isolation transfer switches and controllers shall be the products of the same manufacturer.

1.2 CODES AND STANDARDS

A. The bypass isolation switch and controls shall conform to the requirements of:
- UL 1008 - Standard for Transfer Switch Equipment
- IEC 947-6-1 Low-voltage Switchgear and Control gear; Multifunction equipment; Automatic Transfer Switching Equipment
- NFPA 70 - National Electrical Code
- NFPA 99 - Essential Electrical Systems for Health Care Facilities
- NFPA 110 - Emergency and Standby Power Systems
- IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- NEMA Standard ICS10-1993 (formerly ICS2-447) - AC Automatic Transfer Switches
- UL 508 Industrial Control Equipment
- CSA 22.2 No. 178 Certification

1.3 ACCEPTABLE MANUFACTURERS

A. Automatic transfer switches & bypass isolation switches shall be Kohler Bypass/Isolation - Programmed Transition (KBP)/KBPDCVA0400B. Any alternate shall be submitted for approval to the consulting engineer at least 10 days prior to bid. Alternate bids must list any deviations from this specification.

1.4 MECHANICALLY HELD TRANSFER SWITCH

A. The transfer switch shall be electrically operated and mechanically held and interlocked to prevent connection of the two sources. The electrical operator shall be a momentarily energized, solenoid mechanism. Main operators utilizing which include overcurrent disconnect devices, linear motors or gears shall not be acceptable. The switch shall be mechanically interlocked to ensure only three possible positions, normal, emergency, or off.

B. All transfer switch sizes shall use only one type of main operator for ease of maintenance and commonality of parts.

C. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.

D. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.

E. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 600 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.

F. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, which are not intended for continuous duty, repetitive switching or transfer between two active power sources, are not acceptable.

G. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor plate with fully rated AL-CU pressure connectors shall be provided.

H. Where neutral conductors must be switched as shown on the plans, the contactor shall be provided with fully rated switched neutral transfer contacts. Overlapping neutral contacts may be used as an alternative.

1.5 BYPASS-ISOLATION SWITCH

A. A two-way bypass-isolation switch shall provide manual bypass of the load to either source and Permit isolation of the automatic transfer switch from all source and load power conductors. All main contacts shall be manually driven.

B. Power interconnections shall be silver-plated copper bus bar. The only field installed power connections shall be at the service and load terminals of the bypass-isolation switch. All control interwiring shall be provided with disconnect plugs.

C. Separate bypass and isolation handles shall be utilized to provide clear distinction between the functions. Handles shall be permanently affixed and operable without opening the enclosure door. Designs requiring insertion of loose operating handles or opening of the enclosure door to operate are not acceptable.

D. Bypass to the load-carrying source shall be accomplished with no interruption of power to the load (make before break contacts). Designs which disconnect the load when bypassing are not acceptable. The bypass handle shall have three operating modes: "Bypass to Normal," "Automatic," and "Bypass to Emergency." The operating speed of the bypass contacts shall be the same as the associated transfer switch and shall be independent of the speed at which the manual handle is operated. In the "Automatic" mode, the bypass contacts shall be out of the power circuit so that they will not be subjected to fault currents to which the system may be subjected.

E. The isolation handle shall provide three operating modes: "Closed," "Test," and "Open."

The "Test" mode shall permit testing of the entire emergency power system, including the automatic transfer switch with no interruption of power to the load. The "Open" mode shall completely isolate the automatic transfer switch from all source and load power conductors. When in the "Open" mode, it shall be possible to completely withdraw the automatic transfer switch for inspection or maintenance to conform to code requirements without removal of power

conductors or the use of any tools.

F. When the isolation switch is in the "Test" or "Open" mode, the bypass switch shall function as a manual transfer switch.

G. Designs requiring operation of key interlocks for bypass isolation or ATS(s) which cannot be completely withdrawn when isolated are not acceptable.

1.6 CONTROLLER DISPLAY AND KEYPAD

A. A four line, 20 character LCD display and dynamic 4 button keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the communications interface port. The following parameters shall only be adjustable via a password protected programming on the controller (dip switches shall not be acceptable):

- Nominal line voltage and frequency
- Single or three phase sensing
- Operating parameter protection
- Transfer operating mode configuration (Open transition, Closed transition, or Delayed transition)

All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

1.7 VOLTAGE, FREQUENCY AND PHASE ROTATION SENSING

A. Voltage (all phases) and frequency on both the normal and emergency sources shall be continuously monitored, with the following pickup, dropout, and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter	Dropout/Trip	Pickup/Reset
Under voltage	75 to 98%	85 to 100%
Over voltage	105 to 135%	95 to 100% of trip
Under frequency	85 to 99%	95 to 99%
Over frequency	105 to 120%	101 to 105%
Voltage unbalance	5 to 20%	3% to 18%

B. Repetitive accuracy of all settings shall be within ± 0.5% over an operating temperature range of -20°C to 70°C.

C. An adjustable dropout time for transient voltage and frequency excursions shall be provided. The time delays shall be 0.1 to 9.9 seconds for voltage and .1 to 15 seconds for frequency.

D. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via the communications interface port.

E. The controller shall be capable of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or BAC). Unacceptable phase rotation shall be indicated on the LCD; the service

required LED and the annunciation through communication protocol and dry contacts. In addition, the phase rotation sensing shall be capable of being defeated, if required.

F. The controller shall be capable of detecting a single phasing condition of a source, even though a voltage may be regenerated by the load. This condition shall be considered a failed source.

G. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage on all 3 phases (phase to phase and phase to neutral), frequency, and phase rotation.

1.8 TIME DELAYS

A. An adjustable time delay of 0 to 10 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 12 or 24 VDC power supply.

B. A time delay shall be provided on transfer to the emergency source, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

C. A time delay shall be provided on re-transfer to normal. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

D. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

E. A time delay activated output signal shall also be provided to drive external relay(s) for selective load disconnect control. The controller shall be capable of controlling a maximum of 9 individual output time delays to step loads on after a transfer occurs. Each output may be individually programmed for their own time delay of up to 60 minutes. Each sequence shall be independently programmed for transferring from normal to emergency and transferring from emergency to normal.

The controller shall also include the following built-in time delays for the following operations:

- 0 to 60 minute time delay on failure to acquire the acceptable electrical parameters from the emergency source
- 0 to 60 minute time delay for a failure to synchronize on an in-phase operation.
- 60 minute time delay for the load disconnect position for delayed transition operation.

F. All time delays shall be adjustable in 1 second increments.

G. All time delays shall be adjustable by using the display and keypad or with a

remote device connected to the communications interface port through a security-password system.

H. All time delays shall be adjustable by using the display and keypad or with a remote device connected to the communications interface port through a security-password system.

I. Each time delay shall be identified and a dynamic countdown shall be shown on the display.

J. A time delay shall be provided to delay the transfer while in the "off" position. The time delays shall be adjustable from 0 to 60 minutes.

1.9 ADDITIONAL FEATURES

A. The controller shall have 3 levels of security. Level 1 shall allow monitoring of settings and parameters only. The Level 1 shall be capable of restricted with the use of a lockable cover. Level 2 shall allow test functions to be performed and Level 3 shall allow setting of all parameters

B. Membrane-type switches shall be provided for the test functions and be maintained until the end test function is activated. The test function shall be allowed through password security. It shall be possible to defeat the password requirement by way of a circuit board, mounted dip switch setting. The test function shall be load, no load or auto test. The auto test function shall request an elapsed time for test. At the completion of this time delay the test shall be automatically ended and a retransfer sequence shall commence. All loaded tests shall be immediately ended and retransfer shall occur if the emergency source fails and the normal source is acceptable.

C. A SPDT contact, rated 5 amps at 30 VDC, shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

D. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of two contacts, closed when the ATS is connected to the normal source and two contacts closed, when the ATS is connected to the emergency source.

E. LED indicating lights shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).

F. LED indicating lights shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal (green) and emergency sources (red), as determined by the voltage, frequency and phase rotation sensing trip and reset settings for each source.

G. A membrane switch shall be provided on the membrane panel to test all indicating lights and display when pressed.

H. Provide the ability to select “commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the

normal source restores before the generator is ready to accept the load.

I. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which closes to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad or the communications interface port. A “not-in-auto" LED shall indicate anytime the controller is inhibiting transfer from occurring.

J. An in-phase monitor shall be a standard feature in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The in-phase monitor shall be specifically designed for and be the product of the ATS manufacturer. The in-phase monitor shall be capable of being enabled or disabled from the user interface.

K. The controller shall be capable of accepting two separate external normally open contacts that will allow the functions described in the “input". In addition, the controller shall have two separate “C" form contacts that will function as described in the “output". The controller shall be capable of expanding the number of inputs and outputs with additional modules.

- The controller interface modules shall communicate with the transfer switch controller by way of I^2C communications bus.

- An optional input/output module shall be furnished which mounts on the inside of the enclosure to facilitate ease of connections. The modules shall provided with form "C" contact outputs rated for up to 12A @ 240VAC or 2A @ 480VAC that can be programmed from the following values:

- Common alarm events
- Contactor position
- Exercise active
- Failure to acquire standby source
- Failure to transfer
- I/O module fault
- Load bank control
- Over/under voltage
- Peak shave active
- Phase rotation error
- Preferred source supplying load
- Source available
- Standby source supplying load
- Excessive synchronizing time

- Load control active
- Loss of phase fault
- External battery fault
- Non-emergency transfer
- Over/under frequency
- Test active
- Transfer switch aux contact fault
- Voltage unbalance
- Not in automatic mode

- The module shall also have 2 inputs for external controls that can be programmed from the following values:

- Time delay bypass
- Battery fault
- Common fault
- Inhibit transfer
- Load shed to force to the Off position
- Peak shave
- Test
- Three source system disable

L. *Engine Exerciser* - The controller shall provide an internal engine exerciser. The engine exerciser shall allow the user to program up to 21 different exercise

routines based on a calendar mode. For each routine, the user shall be able to:

- Enable or disable the routine.
- Enable or disable transfer of the load during routine.
- Set the start time,
  time of day
  day of week
  week of month (1st, 2nd, 3rd, 4th, alternate or every)
- Set the duration of the run.
  At the end of the specified loaded exercise duration the switch shall transfer the load back to normal and run the generator for the specified cool down period. All loaded exercises shall be immediately ended and retransfer shall occur if the standby source fails. The next exercise period shall be displayed on the main screen with the type of exercise, time and date. The type of exercise and the time remaining shall be display when the exercise is active. It shall be possible of ending the exercise event with a single button push.

M. *Date and time* - The date shall automatically adjust for leap year and the time shall have the capability of automatically adjusting for daylight saving and standard times.

N. *System Status* - The controller shall have a default display the following on:

- System status
- Date, time and type of the next exercise event
- Average voltage of the preferred and standby sources

Scrolling through the displays shall indicate the following:

- Line to line and line to neutral voltages for both sources
- Frequency of each source
- Load current for each phase
- Single or three phase operation
- Type of transition
- Preferred source
- Commit or no commit modes of operation
- Source/source mode (Utility/Gen; Gen/Gen; Utility/Utility)
- In phase monitor enable/disable
- Phase rotation
- Date and time

O. Controllers that require multiple screens to determine system status or display “coded" system status messages, which must be explained by references in the operator’s manual, are not permissible.

P. *Self Diagnostics* - The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

Q. *Communications Interface* - The controller shall be capable of interfacing, through a standard communications with a network of transfer switches and

generators. It shall be able to be connected via an RS-485 serial communication (up to 4000 ft. direct connect or multi-drop configuration), an Ethernet connectivity (over standard 10baseT Ethernet networks utilizing a RJ-45 port or remotely utilizing a dial-up modem). This module shall allow for seamless integration of existing or new communication transfer devices and generators. Monitoring software shall allow for the viewing, control and setup of parameters of the genset and transfer switch network through a standard personal computer utilizing current Microsoft operating systems. Separate and specific transfer switch software interfaces shall not be acceptable.

R. The transfer switch shall also be able to interface to 3rd party applications using Modbus RTU and Modbus TCP/IP open standard protocols utilizing Modbus register maps. Proprietary protocols shall not be acceptable.

S. The controller shall contain a USB port for downloading the controller's parameters and settings; exercise event schedules; maintenance records and event history. The file designator shall be the unique serial number of the transfer switch.

T. *Data Logging* - The controller shall have the ability to log data and to maintain the last 2000 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory. The controller shall be able to display up to the last 99 events. The remaining events shall be downloadable to be displayed on a computer.

- Event Logging
  Data, date and time indication of any event.
- Statistical Data
  Total number of transfers.*
  Total number of fail to transfers.*
  Total number of transfers due to preferred source failure.*
  Total number of minutes of operation.*
  Total number of minutes in the standby source.*
  Total number of minutes not in the preferred source*
  Normal to emergency transfer time
  Emergency to normal transfer time
  System start date
  Last maintenance date

* The statistical data shall be held in two registers. One register shall contain data since start up and the second register shall contain data from the last maintenance reset.

U. *External DC Power Supply* - An optional provision shall be available to connect up to two external 12/24 VDC power supply to allow the LCD and the door mounted control indicators to remain functional when both power sources are dead for extended periods of time. This module shall contain reverse battery connection indication and circuit protection.

1.10 ENCLOSURE

A. The ATS shall be furnished in a NEMA 1 (A) enclosure.

B. All standard door mounted switches and long life super bright type indicating LEDs described in section 3 shall be integrated into a flush-mounted, interface membrane or equivalent in the enclosure door for easy viewing & replacement. The panel shall be capable of having manual locking feature to allow the user to lockout all membrane mounted control switches to prevent unauthorized tampering. This cover shall be mounted with hinges and have a latch that may be padlocked. The cover shall have the option of a “see-through" window to allow viewing indicating LEDs and display. The membrane panel shall be suitable for mounting by others when furnished on open type units.

1.11 TESTS AND CERTIFICATION

A. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

B. The ATS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation, and servicing in accordance with ISO 9001.

1.12 SERVICE REPRESENTATION

A. The manufacturer shall maintain a national service organization of employing personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

1.13 ACCESSORIES

A. Alarm Module. The alarm module shall be 90dB audible alarm; any alarm function can be programmed to trigger the audible alarm, with external alarm connection. The audible alarm can be set to sound under selected fault conditions through setup on the user interface. The other options that can be activated with the alarm board are the Chicago alarm option, Preferred Source selection and the Supervised Transfer Control Switch.

B. Standard I/O Module. The standard I/O Module has two programmable inputs and six programmable outputs.

Inputs Available	2
Contact Closure	Contact Closure
Current	5mA Max.
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Max Distance	700 feet
Outputs Available	6
Contact Type	Form C (SPDT)

Contact Rating	2A @ 30VDC
	500mA @ 125VAC
Connection Type	Terminal Strip
Wire Size	#14-24 AWG

C. High Power I/O Module. The high power I/O Module has two programmable inputs and three programmable outputs.

Inputs Available	2
Contact Closure	Contact
	Closure
Current	5mA Max.
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Max Distance	700 feet
Outputs Available	3
Contact Type	Form C (SPDT)
Contact Rating	12A @ 24VDC
	12A @ 250VAC
	10A @ 277VAC
	2A @ 480VAC
Connection Type	Terminal Strip
Wire Size	#14-24 AWG

D. External Battery Supply Module. The external battery shall energize the ATS controls using an external battery when no source power is available, allow extended engine start time delays, the use of any combination of accessory modules, connect to one or two batteries, 12 VDC or 24 VDC, current draw, 140 mA @ 12 VDC, 86 mA @ 24 VDC, shall provide low external battery voltage indication to the transfer switch controller, and reverse-polarity protected.

E. Current Sensing. Current sensing shall measure the load bus current on all phases with 1% accuracy. Load current shall be viewable on the controller LCD display.

F. Digital Meter. The digital meter shall be capable of setting and displaying voltage, current, frequency and power for both sources. Programmable visual alarms shall be standard for high and low voltage and high current. A serial, RS-485 port and two auxiliary contacts shall be standard. Programming menus shall be password protected.

G. Line to Neutral Monitoring. Line-to-neutral voltage monitoring shall allow the display of the AN, BN, and CN RMS voltages in the normal operation menus.

H. Logic Disconnect Switch. A Logic disconnect switch shall be mounted inside the enclosure, and shall disconnect power to controller without disconnecting the load. The logic disconnect switch shall disconnect utility power to the controller during maintenance and service without disconnecting power to the load. The switch has two positions, auto and disconnect. The disconnect position shall disconnect the voltage sensing leads for the utility source (A, B, C, N). It is assumed that the user shall disable the generator by placing the controller in the OFF position.

I. Padlockable User Interface Cover. The user interface cover shall protect the controller user interface from the environment. This shall be available with and without a viewing window. A Type 3R enclosure shall require the non-viewable option.

J. Seismic Certification. The seismic certification shall be available for 150-3000 amp switches with NEMA 1 enclosures. Certification shall depend on geographic location. Contact local distributor for details.

K. Supervised Transfer Control Switch. The supervised transfer control switch shall provide a door mounted, three position, selector switch with Auto, Manual and Transfer positions.

The alarm module shall be required in order to activate this option.

1. With the controller set to the automatic mode and the selector switch in the Auto position, the user transfer switch shall operate normally.
2. With the controller set to the automatic mode and the selector switch in the Manual position, the user shall be required to toggle the selector switch to initiate a transfer from the emergency to the normal position.
3. With the controller set to the non-automatic mode and the selector switch in the Manual position, the user shall be required to toggle the selector switch to the transfer position to initiate a transfer in either direction. In this mode, the ATS shall not automatically transfer to an acceptable source in the case of source failure, without the user toggling the selector switch to the transfer position.

L. Monitor III Software. Monitor III software shall provide the following:

1. Monitor and control the power system's generator sets and transfer switches from a personal computer using a single software package.
2. Monitor and control system through a Windows®-based graphical user interface.
3. Monitor and control systems over a local area network, remotely via a modern connection, or through an Ethernet connection.
4. Password-protected data access: Guest, User, and Supervisor levels
5. Ethernet capability
6. Start or stop a test from a remote PC
7. Assign inputs and outputs
8. View and adjust trip points, time delays, and system parameters
9. Available as loose kits:
   a. Software kit with serial code
   b. Software kit with modem and cables

M. Digital Meter. The digital meter shall be capable of setting and displaying voltage, current, frequency and power for both sources. Programmable visual

alarms shall be standard for high and low voltage and high current. A serial, RS-485 port and two auxiliary contacts shall be standard. Programming menus shall be password protected.

N. Suppression, Transient Voltage Surge (TVSS) - A TVSS shall be provided for protection of the normal source supply. The TVSS shall be provided with a 30A circuit breaker disconnect to allow for replacement of the device without disconnecting the normal source supply. A 90dB audible alarm shall be provided as standard. A terminal block for remote contacts shall be provided for a Form C contact, rated at 3A, 120VAC, 60W DC. The TVSS shall provide L-L, L-N, L-G, and N-G lines shall be protected. LED status indicators shall be available on the face of the device to indicate operational state. The TVSS device shall be listed to UL 1449, Edition 3.

O. Heater, Anti-Condensation - An enclosure heater strip shall be supplied inside the transfer switch enclosure and shall be controlled by an adjustable humidistat. The humidistat shall be adjustable from 35% to 95% relative humidity, factory set at 65%. 120VAC power for the strip heater is to be provided by others. A 15A protective circuit breaker is provided. The heater option shall provide 125W or 250W, pending on the configured kit selection.

END OF SECTION 16625.2

SECTION 16670
LIGHTNING PROTECTION SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Air Terminals and Interconnecting Conductors.

B. Grounding and Bonding for Lightning Protection.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 16110 Conduit and Raceways.

1.3 REFERENCES

A. ANSI/NFPA 780—Standard for the Installation of Lightning Protection Systems.

B. ANSI/UL 96—Lightning Protection Components.

C. LPI—Lightning Protection Institute.

D. UL 96A—Installation Requirements for Lightning Protection Systems.

1.4 SYSTEM DESCRIPTION

A. Lightning Protection System: ANSI/NFPA 780; Class I UL 96A; Master Labeled system protecting system, consisting of air terminals on roofs, roof-mounted mechanical equipment, chimneys and stacks, and penthouse roofs; bonding of structure and other metal objects; grounding electrodes; and interconnecting conductors. Run all cabling concealed where ever possible.

B. Complete lightning protection shall be provided and installed for all buildings and facilities meeting I.E.F.F. Standards.

1.5 SUBMITTALS

A. Submit shop drawings and product data.

B. Submit shop drawings showing layout of air terminals, grounding electrodes, and bonding connections to structure and other metal objects. Include terminal, electrode, and conductor sizes, and connection and termination details.

C. Submit product data showing dimensions and materials of each component, and include indication of listing in accordance with ANSI/UL 96.

D. Submit manufacturer's installation instructions.

1.6 PROJECT RECORD DOCUMENTS

A. Submit project record documents.

B. Accurately record actual locations of air terminals, grounding electrodes, bonding connections, and routing of system conductors.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in lightning protection equipment with minimum five (5) years documented experience.

B. Installer: Authorized installer of manufacturer with minimum five (5) years documented experience.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference one (1) week prior to commencing work of this Section.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with roofing and exterior and interior finish installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Approved Lightning Protection, Co., Inc.
2. Crowley Lightning Protection, Inc.
3. East Coast Lighting Equipment.
4. ERICO International Corporation.
5. Independent Protection Co.
6. National Lightning Protection Corp.
7. Robbins Lightning, Inc.
8. Thompson Lightning Protection, Inc.

2.2 GENERAL

A. Provide lightning protection system materials and components that comply with manufacturer's standard design, in accordance with published product information. Provide air terminals, bonding plates, conductors, connectors, conductor straps, fasteners, grounding plates, grounding rods, rod clamps, splicers and other components required for a complete system that meets NFPA 780 standards and UL 96.

B. Type of metal for air terminals and cables: Copper.

C. Type of Down Conductor: Copper down conductor.

2.3 AIR TERMINALS

A. Air terminals shall be 1/2 inch minimum diameter solid copper with blunt tips and shall extend at least 12 inches above the object to be protected. All air terminal bases shall be cast copper with stainless steel bolt-pressure cable connectors.
1. Base for flat roofs or equipment mounting and shall be suitable for appropriate mounting to roofing materials.
2. Spring type air terminals shall not be used.
3. 5/8 inch aluminum air terminals may be used for aluminum equipment mounting (i.e. handrails).

2.4 MAIN ROOF INTERCONNECTING AND DOWN CONDUCTORS

A. Minimum UL listed strands of 15 gauge copper wire weighing 375 lbs. per 1000 feet, rope lay and installed according to UL Code.

2.5 INDIVIDUAL METALLIC ROOFTOP BUILDING EQUIPMENT BONDING CONDUCTORS

A. Minimum UL listed strands of 17 gauge copper wire of 26,240 CM cross section, rope lay or braided and installed according to the NFPA 780.

2.6 FASTENERS

A. Conductor fasteners shall be an approved type of non-corrosive metal and shall have sufficient strength to support conductors.

2.7 CONNECTORS

A. Accessible conductor connectors shall be cast copper or bronze with screw-pressure type stainless steel bolts and nuts.

B. Inaccessible, including underground installations, conductor connectors shall be made using a molded fusion welding process, equal to Cadweld, using proper mold and the number, size and type cartridge for the connection.

2.8 GROUND RODS

A. Solid Copper Clad.

2.9 CONDUIT

A. Minimum Schedule 40 PVC.

B. Air Terminals for roof mounting: Provide units with bases especially designed for roof materials.

2.10 SERVICE GROUNDING: BOND LIGHTNING PROTECTION TO MAIN SERVICE GROUNDING ELECTRODE SYSTEM.

PART 3 - EXECUTION

3.1 INSTALLATION OF LIGHTNING PROTECTION SYSTEMS

A. Install lightning protection systems as described herein, in accordance with equipment manufacturer's drawings, written instructions, and in compliance with applicable installation standards specified above.

B. Install the system, including air terminals, conductors, and complementary parts, so that completed work is unobtrusive and does not detract from the building appearance.

C. Coordinate air terminal and conductor locations with window washing equipment supplier. Perimeter air terminals shall be spaced at maximum of 20 feet. Maintain equal spacing.

D. Install conductors with direct paths from air terminals to ground connections avoiding sharp bends and narrow loops. Run concealed interior conductors in non-metallic raceway, Schedule 40, minimum. Fasten cable and/or conduit on maximum three foot centers.

E. Do not use the building structural steel as down conductor.

F. Conceal all down conductors and install in 1-1/2" minimum schedule 40, PVC conduit.

G. Ground connections shall be welded to steel columns at the column base. Ground rod connections to be made at same column as roof down lead conductor column connections.
   1. Ground electrode connections to the ground rod shall be made at a point not less than one foot below grade and at least two feet away from a foundation wall or footing.
   2. Attach ground rod conductors to steel columns at Level 1 with bonding plates having a surface area of not less than 8 square inches which shall be exothermic welded to cleaned areas of the structural columns.

H. Bond the nearest down conductor to the water and gas services on the street side of the associated meters.

I. Splices and Clamps: Use approved molded welded fusion weld connections for all inaccessible (when project completed) conductor splices and all inaccessible (when project completed) and underground connections between conductors and other components. Provide bonding jumper at structural steel grounded column joints.

J. Coordinate and use proper roof flashings at all roof penetrations as recommended by roofer.

K. Metal bodies including roof drains, vent pipes, etc. located within six feet of a lightning conductor shall be connected to the system. Metal bodies also require inter-connection even though they are over six feet from lightning conductor, if they are within six feet of a metal body already connected.

L. All connections which will be inaccessible when the project is completed shall be made using an exothermic welding process equal to Cadweld or Copperweld.

M. Provide miscellaneous bonding to railing, window washing davits, satellite dishes, antennas, etc.

3.2 CORROSION PROTECTION

A. Use no combination of materials that may form an electrolytic couple of such nature that corrosion is accelerated in the presence of moisture, unless moisture is permanently excluded from the junction of such metals. Where unusual conditions exist that would cause deterioration or corrosion of conductors, use conductors with suitable protective coatings.

3.3 GROUNDING AND BONDING

A. Provide equipment grounding and bonding connections sufficiently tight to assure permanent and effective grounds and bonds.

3.4 FIELD QUALITY CONTROL

A. UL Inspection: Provide inspections as required to obtain a UL Master Label for system.

B. Provide an inspection by an inspector certified by LPI to obtain an LPI certification.

END OF SECTION 16670

SECTION 16721

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Provisions and Special Conditions, and Division 1 Specification sections, apply to work of this section.

1.2 SUMMARY

A. Section Includes:
1. Fire-alarm control unit provided by Fire Lite Model MS-9600VDLS with DACT-2VID. Other manufacturers must be pre-approved by Owner and Engineer.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Magnetic door holders.
7. Remote annunciator.
8. Addressable interface device.
9. Digital alarm communicator transmitter.
10. System printer.

1.3 SYSTEM DESCRIPTION

A. Non-proprietary and non-coded, UL Listed intelligent analog addressable fire alarm system with multiplexed signal transmission.

B. The System supplied under this specification utilize independently addressed, input/output modules, power supply(s) as described in this specification. The system contain fire alarm control panel is provided by the owner, remote annunciator(s) and NAC power supply(s).

1.4 PERFORMANCE REQUIREMENTS

A. Installation shall be in accordance with the drawings, specifications and the following current Florida Code:
1. NFPA 70 National Electrical Code
2. NFPA 72 National Fire Alarm Code
3. NFPA 101 Life Safety Code
4. NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems
5. NFPA 13 Standard for the Installation of Sprinkler Systems
6. Americans with Disabilities Accessibility Guidelines
7. ASME A17.1 Elevator Code
8. Florida Building Code

B. System, including all components, shall be listed by Underwriters Laboratories, Inc. (UL) for the fire protective signaling purpose for which used.
   1. UL 864/UOJZ, APOU Control units for Fire Protective Signaling Systems 9th Edition
   2. UL 268 Smoke Detectors for Fire Protective Signaling Systems
   3. UL 268A Smoke Detectors for Duct Applications
   4. UL 521 Heat Detectors for Fire Protective Signaling Systems
   5. UL 228 Door Holders for Fire Protective Signaling Systems
   6. UL 464 Audible Signaling Appliances
   7. UL 1638 Visual Signaling Appliances
   8. UL 38 Manually Activated Signaling Boxes
   9. UL 346 Water-flow Indicators for Fire Protective Signaling System
   10. UL 1971 Standard for Signaling Devices for the Hearing Impaired
   11. UL 1481 Power Supplies for Fire Protective Signaling Systems

1.5 SUBMITTALS

A. The Contractor shall purchase no equipment for the system specified herein until the Owner has approved the project submittals in their entirety and has returned them to the contractor. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications. The Contractor shall minimum submit six (6) complete sets of documentation within 30 calendar days after award of purchase order.

B. Each submittal shall include a cover letter providing a list of each variation that the submittal may have from the requirements of the Contract Documents. In addition, the Contractor shall provide specific notation on each Shop Drawing, sample, catalog cut, data sheet, installation manual, etc. submitted for review and approval, of each such variation.
   1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to the owner and Engineer.
   2. Shop Drawings shall be prepared by persons with the following qualifications:
      a. Trained and certified by manufacturer in fire-alarm system design.
      b. NICET-certified fire-alarm technician, Level IV minimum

C. Product Data: Product Data sheets with the printed logo or trademark of the manufacturer of all equipment. Indicated in the documentation shall be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Owner.

D. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72.
   2. Include voltage drop calculations for notification appliance circuits.
   3. Include battery-size calculations.
   4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
6. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

E. Operation and Maintenance Data: For fire-alarm systems and components to be included in emergency, operation, and maintenance manuals. In addition , include the following:
1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.
2. Provide "Record of Completion Documents" according to NFPA72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Record copy of site-specific software database file, hardcopy print-out and CD, with password for delivery to the owner. Proprietary system/service companies will not be acceptable.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA72 article of the same name and include the following:
   a. Frequency of testing of installed components.
   b. Frequency of inspection of installed components.
   c. Requirements and recommendations related to results of maintenance.
   d. Manufacturer's user training manuals (hardcopy) and electronic on CD.
5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.
7. Copy of NFPA 72.

F. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application.
5. CD of site-specific software database file with password, and electronic product data sheets.
6. Provide hard copy print-out of the software program. Proprietary system/service companies will not be acceptable.
7. Provide a complete system comparison report for each change implemented during the warranty period.
8. Provide a list of global system settings
9. Provide a list of the contents of each system cabinet and their settings
10. Provide a list of all addressable devices with their addresses and settings

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.

C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, by a qualified testing agency, and marked for intended location and application.

E. NFPA Certification: Obtain certification according to NFPA72 in the form of a placard by an approved alarm company.

1.7 WARRANTY and SOFTWARE SERVICE AGREEMENT

A. The contractor shall warranty all materials, installation and workmanship for two (2) years from date of acceptance, unless otherwise specified. A copy of the manufacturers' warranty shall be provided with closeout documentation and included with the operation and installation manuals.

B. The System Supplier shall maintain a service organization with adequate spare parts stocked within 75 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the Owner notifying the contractor.

C. Technical Support: Beginning with Substantial Completion, provide software support for three (3) shall be included in this project.

D. Detector Sensitivity Testing: During the warranty period, each year the contractor is to perform detector sensitivity testing and provide report to the Owner. Unless, the system is UL Listed to perform automatic sensitivity testing without any manual intervention and should detector fall outside of sensitivity window, the system will automatically indicate a device trouble. A copy of UL letter is to be provided as proof of system operation.

E. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within five (5) years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
   1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Smoke Detectors, heat detectors, monitor modules and control modules: Quantity equal to 5% percent of amount of each type installed, but no fewer than 3 units of each type.
   2. Keys: Ten extra set for access to locked and tamperproof components.
   3. Audible and Visual Notification Appliances: 5% of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The fire alarm control panel is manufactured by Fire Lite Model MS-9600UDLS with DACT-2UD. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling fire alarm system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

B. The Contractor shall provide, from the acceptable manufacturer's current product lines, equipment and components, which comply, with the requirements of these Specifications. Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.

C. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, and will accommodate the future requirements and operations of the building Owner. All specified operational features must be met without exception.

D. All control panel assemblies and connected field appliances shall be provided by the same System Supplier, and shall be designed and tested to ensure that the system operates as specified. All equipment and components shall be installed in strict compliance with the manufacturer's recommendations.

E. Upon completion of the project the Owner shall be provided with a hard copy printout of the system software database and an electronic version of the system program and database with all required passwords.

F. That equipment proposed to be supplied will be considered only if it meets all sections of the performance specification. Any deviations of system performance outlined in this specification will only be considered when the following requirements have been met:

1. A complete description of proposed alternate system performance methods with three (3) copies of working drawings thereof for approval by the Owner and Engineer, not less than ten (10) calendar days prior to the scheduled date for submission of bids.
2. The supplier of alternate equipment shall furnish evidence that the proposed alternate system performance is equal to or superior than the system operation stated in the specification. Such evidence shall be submitted to the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.
3. The supplier shall submit a point-by-point statement of compliance for all sections in this specification. The statement of compliance shall consist of a list of all paragraphs within these sections. Where the proposed system complies fully with the paragraph as written, placing the word "comply" opposite the paragraph number shall indicate such. Where the proposed system does not comply with the paragraph as written, and the supplier feels the proposed system will accomplish the intent of the paragraph, a full description of the function as well as a full narrative description of how

its proposal will meet its intent shall be provided. Any submission that does not include a point-by-point statement of compliance as described herein shall be disqualified. Where a full description is not provided, it shall be assumed that the proposed system does not comply.

4. The supplier of alternate equipment shall submit a list from the alternate manufacture on the manufactures letterhead indicating the names and addresses of all authorized suppliers in the area. Proprietary products will not be considered.
5. The acceptability of any alternate proposed system shall be the sole decision of the Owner or his authorized representative.

G. Approved Products: All peripheral devices shall be of the standard product of single manufacturer and shall display the manufacturer's name of each component. The catalog numbers specified under this section are those of Fire Lite and shall constitute the type, product quality, material and desired operating features.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:
1. Manual stations.
2. Heat detectors.
3. Flame detectors.
4. Smoke detectors.
5. Duct smoke detectors.
6. Verified automatic alarm operation of smoke detectors.
7. Automatic sprinkler system water flow.
8. Heat detectors in elevator shaft and pit.

B. Fire-alarm signal shall initiate the following actions:
1. Activate the audible and visual notification appliances.
2. Identify alarm at fire-alarm control unit.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
6. Activate emergency shutoffs for gas and fuel supplies.
7. Record events in the system memory.
8. Record events by the system printer.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Valve supervisory switch.
2. Low-air-pressure switch of a dry-pipe sprinkler system.
3. Elevator shunt-trip supervision. Coordinate with elevator contractor and section 16723.

D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.

2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at fire-alarm control unit.
4. Ground or a single break in fire-alarm control unit internal circuits.
5. Abnormal ac voltage at fire-alarm control unit.
6. Break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at fire-alarm control unit or annunciator.
9. Low-air-pressure switch operation on a dry-pipe or pre-action sprinkler system.

E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciator. Record the event on system printer.

2.3 CONTROL PANEL (provided by Owner)

A. The FACP shall be a Fire-Lite Alarms model MS-9600 and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: addressable detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. System Capacity and General Operation
1. The control panel shall provide, or be capable of expansion to 318 addressable detectors and 318 monitor or control modules (636 addressable devices).
2. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit, 80-character Liquid Crystal Display, individual, color coded system status LEDs, and an alphanumeric keypad for the Field Programming and control of the Fire Alarm System.
3. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.
4. The FACP shall provide the following features: Maintenance Alert to warn of excessive detector dirt or dust. Detector sensitivity read/test information and System Status Reports to display or print. Smoke Detector Alarm Verification. Pre-signal, meeting NFPA 72 requirements. Rapid manual station reporting (under 3 seconds). Periodic Detector Test, conducted automatically by the control panel every two hours. March time, temporal (ANSI Cadence) and California Code coding options. Walk Test will check for two detectors set to same address.
5. The main CPU shall contain Form-C relay contacts rated at 2.0 amps/30VDC for the following: Alarm, Trouble, and Supervisory.
6. The CPU shall contain two Class A programmable Notification Appliance Circuits.

C. Central Microprocessor
1. The Microprocessor shall communicate with, monitor, and control all external interfaces with the control panel. It shall include EPROM for system program storage; non-volatile memory for building-specific program storage; and a "watch dog" timer circuit to detect and report microprocessor failure.

2. The Microprocessor shall contain and execute all programming for specific action to be taken if an alarm condition is detected by the system. Such programming shall be held in non-volatile programmable memory and shall not be lost if both the system primary and secondary power failure occurs.
3. The Microprocessor Unit shall also provide a Real-Time Clock for time annotation of system displays, printer, and history file.
4. The Microprocessor Unit shall contain flash memory capabilities for easy upload/download for upgrades of software.
5. All clock, date and history files shall be maintained during power loss.

D. Display
1. The Display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
2. The Display shall include status information and custom alphanumeric labels for all Addressable Detectors, Addressable Modules and Software zones.
3. The Display shall provide a 80-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide 9 Light-Emitting-Diodes (LEDs), consisting of and not limited to the following: AC POWER, FIRE ALARM, SUPERVISORY, SYSTEM TROUBLE, MAINTENANCE, ALARM SILENCED, DISABLED, BATTERY, and GROUND.
4. The Display shall provide a 25-key touch key-pad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
5. The Display shall include the following operator switches: ACKNOWLEDGE/STEP ALARM SILENCE, DRILL, and SYSTEM RESET (also serving as a lamp test switch).

E. Signaling Line Circuit Interface
1. The SLC Interface shall provide power to, and communicate with, all of the Addressable Detectors and Addressable Modules over a single pair of wires. This SLC Loop shall be capable of NFPA Style 4, Style 6, or Style 7 operation.
2. The SLC interface shall receive information from all Addressable Devices. This information shall be processed to determine whether normal, alarm, or trouble conditions exist for each detector. This information may also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
3. The Signaling Line Circuit shall be capable of distances of 10,000 feet (@ 12 AWG, twisted). For retrofit applications, the system shall support up to 3,000 feet of untwisted, unshielded wire. (Loop 1 only)

F. Serial Interfaces
1. An EIA-232 interface between the Fire Alarm Control Panel and UL Listed Electronic Data Processing (EDP) peripherals shall be provided. The EIA-232 interface shall allow the use of printers, or for an interface to an off-line PC programmer.
2. An EIA-485 port shall be available for the serial connection of optional remote led-type annunciators. EIA-485 in terminal mode shall allow serial connection of optional LCD, English language remote system displays. LED (per zone or point) annunciators shall also be provided. The maximum distance to the furthest annunciator shall be 3,000 feet. The system shall support a maximum of

32, remote annunciators on a single twisted, shielded pair. The maximum distance to the furthest annunciator shall be 6,000 feet.

3. A PS2/PC keyboard connection shall be provided to support the connection of a PC keyboard for local programming of the fire alarm system.

G. Enclosures:
   1. The control panel shall be housed in a UL listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion protected.
   2. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
   3. An optional semi-flush trim ring shall be available for a neat cabinet dress.

H. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

I. Optional plug-in modules shall be provided for NFPA 72 auxiliary and remote station fire alarm systems as well as a Digital Alarm Communicator Transmitter for NFPA 72 Central Station systems. The DACT (Fire-Lite Alarms model UDACT) shall meet all current UL requirements for delayed AC fail reporting and shall be capable of reporting individual signals for all 636 points.

J. Optional modules (FireLite Alarms model ACM-8RF) shall provide eight Form-C relays rated at 5.0 amps (Relays shall track programmable software zones) and (Fire-Lite Alarms model 4XTMF) Municipal box connection and reverse polarity connection.

K. Power Supply:
   1. The Power Supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
   2. It shall provide a minimum of 6.0 amps of usable Notification Appliance power.
   3. It shall provide a battery charger for 24 or 60 hours of standby using dual-rate charging techniques for fast battery recharge.
   4. It shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.
   5. It shall be power-limited using fuse-less, quick-acting electronic circuitry meeting the latest UL requirements.

L. Operators Controls
   1. Acknowledge Switch:
      a. Activation of the control panel Acknowledge switch in response to new Alarms and/or Troubles shall silence the local panel piezo electric signal and change the Alarm and Trouble LEDs from flashing mode to steady-ON mode. If multiple Alarm or Trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next Alarm or Trouble condition.
      b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
   2. Signal Silence Switch: Activation of the Signal Silence Switch shall cause all programmed Notification Appliances and relays to return to the normal condition after an alarm condition. The selection of Notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit, auto-silence timers, and an option to silence horns and keep strobes flashing.

3. System Reset Switch: Activation of the System Reset Switch shall cause all electronically latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition. Holding the RESET switch shall perform a Lamp Test function.
4. Drill (Evacuate) Switch: Press and hold of the Drill switch shall activate all Silenceable Notification Appliance circuits. The Drill function shall latch until press of Signal Silence or Reset.

M. Printer
1. A printer may be connected to provide hard-copy printout of all changes in status of the system and shall time-stamp such printouts with the current time-of-day and date. The printer shall communicate with the control panel using an interface complying with Electrical Industries Association standard EIA-232D.

N. Field Programming
1. The system and its respective devices (i.e. smoke detectors and modules) shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.
2. All programming may be accomplished through the standard FACP built-in keypad. As well through using a PC keyboard (connection provided on UNIMODE-9600 main circuit board.)
3. All field-defined programs shall be stored in non-volatile memory and shall not be lost if AC mains and/or battery is lost.
4. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level is used for status level changes such as zone disable or manual on/off commands. A second (higher-level) is used for actual change of program information.
5. Program edit shall not interfere with normal operation and fire protection. If a fire condition is detected during programming operation, the system shall exit programming and perform fire protection functions as programmed.
6. A special program check function shall be provided to detect common operator errors.
7. An Auto-Program (self-learn) function shall be provided to quickly program initial functions within several seconds. During this operation, smoke detectors connected to the Signaling Line Circuit shall be automatically installed without labor intensive operator key commands and the using additional electronic equipment to program each individual detector.
8. For flexibility, an optional off-line programming function, with batch upload/download, shall also be available.

O. Specific System Operations
1. Alarm Verification: The Fire alarm control panel shall have the ability to alarm verify addressable smoke detectors.
2. Point Disable: Any device in the system may be Enabled or Disabled through the system keypad.
3. Point Read: The system shall be able to display or print the following point status diagnostic functions: a. Device Status, b. Device Type, c. Device Label, d. Device Zone Assignments and e. Program Parameters.
4. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.

5. Device Sensitivity Reports: Upon command from the operator, the detectors sensitivity can be read and results printed
6. System History Recording and Reporting: The Fire Alarm Control Panel shall contain a History Buffer that will be capable of storing up to 1,000 system alarms, troubles, or operator actions.
7. Automatic Detector Maintenance Alert: The Fire Alarm Control Panel shall automatically interrogate each Addressable Smoke Detector and shall analyze the detector responses over a period of time. If any addressable Smoke Detector in the system responds with a reading that is below or above normal limits, then the system will enter the Trouble Mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. Software Zones: The FACP shall provide 99 software zones. All addressable devices may be field programmed, to be grouped into these zones for control activation and annunciation purposes. Systems that utilize limited programmability, such as general alarm operation, are unacceptable.

2.4 SYSTEM COMPONENTS

A. Programmable Electronic Sounders
   1. Electronic sounders shall operate on 24 VDC nominal.
   2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones (Temporal Pattern) with an output sound level of at least 90 dBA measured at 10 feet from the device.
   3. Shall be flush or surface mounted as shown on plans.

B. Strobe Lights:
   1. Shall operate on 24 VDC nominal.
   2. Shall meet the requirements of the ADA (Americans with Disabilities Act) as well as UL Standard 1971.

C. Audible/Visual Combination Devices:
   1. Shall meet the applicable requirements of Section A listed above for audibility.
   2. Shall meet the requirements of Section B listed above for visibility.

D. Addressable Manual Pull Box (Fire-Lite Alarms model BG-12LX)
   1. Addressable Manual Stations shall be provided to connect to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loops. Up to 159 addressable manual stations may be connected to each SLC loop.
   2. The Manual Pull Box shall, on command from the Control Panel, send data to the panel representing the state of the manual switch. Manual Fire Alarm Stations shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
   3. All operated stations shall have a positive, visual indication of operation that cannot be reset without the use of a key.
   4. Manual Stations shall be constructed of LEXAN (or polycarbonate equivalent) with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.
   5. Stations shall be suitable for surface mounting, or semiflush mounting as shown on the plans, and shall be installed in accordance with ADA and local codes.

6. The Manual Station shall provide address-setting means using decimal switches Addressable manual stations that use binary address setting methods, such as a dip switch, are much more difficult to install and are subject to installation error, and are not allowable substitutes.

F. Addressable Photoelectric Detectors (Fire-Lite Alarms model SD350)
1. Smoke detectors shall be addressable and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 318 addressable detectors may connect to two separate SLC loops.
2. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density.
3. The detectors shall be low profile ceiling-mount and shall include a twist-lock base.
4. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel.
5. The detectors shall provide address-setting means on the detector head using decimal switches. Because of the possibility of installation error, systems that use binary jumpers on dipswitches to set the detector address are not acceptable. The detectors shall also store an internal identifying code that the control panel shall use to identify the type of detector.
6. The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel. The LED is placed into steady illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED (Fire-Lite Alarms model RA400Z).

G. Addressable Photoelectric Detectors with Fixed Thermal Sensor (Fire-Lite Alarms model SD350T)
1. Smoke detectors shall be addressable and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 318 addressable detectors with fixed thermal sensors (135 degree F) connect to two SLC loops.
2. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density.
3. The detectors with fixed thermal sensors shall alarm at a fixed temperature of 135 degree F.
4. The detectors shall be ceiling-mount and shall include a twist-lock base.
5. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel.
6. The detectors shall provide address-setting means on the detector head using decimal switches. Because of the possibility of installation error, systems that use binary jumpers on dipswitches to set the detector address are not acceptable. Systems that require a special programmer to set the detector address (including temporary connection at the panel) are labor intensive and not acceptable. The detectors shall also store an internal identifying code that the control panel shall use to identify the type of detector.
7. The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions, indicating that the detector is operational and in regular

communication with the control panel. The LED is placed into steady illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED (Fire-Lite Alarms model RA400Z).

H. Addressable Ionization Smoke Detectors (Fire-Lite Alarms model CP350)
1. Smoke Detectors shall be low profile addressable and connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 318 addressable detectors may connect to two SLC loops.
2. The detectors shall use the dual-chamber ionization principal to measure products of combustion.
3. The detectors shall be low profile ceiling-mount and shall include a twist-lock base.
4. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself, by activating a switch, or may be activated remotely on command from the control panel.
5. The detectors shall provide address-setting means on the detector head using decimal switches. Because of the possibility of installation error, systems that use binary jumpers or dipswitches to set the address are not acceptable. They shall also store an internal identifying code that the control panel shall use to identify the type of detector.
6. The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions. The LED is placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect a remote alarm LED (Fire-Lite Alarms model RA400Z).

I. Addressable Monitor Module (Fire-Lite Alarms model MMF-300)
1. Addressable Monitor modules shall be provided to connect one supervised IDC (zone) of conventional Alarm Initiating Devices (any N.O. dry contact device) to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loop.
2. The monitor module shall mount in a 4-inch square, 2-1/8" deep electrical box.
3. The IDC (zone) may be wired for Style D (Class A) or Style B (Class B) operation. The Monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.
4. For difficult to reach areas, the Monitor Module shall be available in a miniature package and shall be no larger than 2-3/4"W x 1-1/4"H x 1/2"D (Fire-Lite Alarms model MMF-301). This version does not support Style D operation or include an LED.

J. Addressable 2-Wire Smoke Detector Monitor Module (Fire-Lite Alarms model MMF-302)
1. Addressable 2-Wire Smoke Detector Monitor Modules shall be provided to connect one supervised IDC (zone) of two-wire conventional smoke detectors to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loop.
2. The monitor module shall mount in a 4-inch square, 2-1/8" deep electrical box.

3. The monitor module shall provide terminal connections for a resettable external supply voltage to provide power to the IDC (zone) of two-wire smoke detectors.
4. The IDC (zone) may be wired for Style D (Class A) or Style B (Class B) operation. The monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.

K. Addressable Dual-Circuit Monitor Module (Fire-Lite Alarms model MDF-300)
1. Addressable Dual-Circuit Monitor Modules shall be provided to connect two supervised IDCs (zones) of conventional Alarm Initiating Devices (any N.O. dry contact device) to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loop.
2. The-monitor module shall mount in a 4-inch square, 2-1/8" deep electrical box.
3. The IDCs (zones) may be wired for Style B (Class B) operation only. The Monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.

L. Addressable Control Module (Fire-Lite Alarms Model CMF-300)
1. Addressable Control Modules shall be provided to supervise and control the operation of one conventional Notification Appliance Circuit (NAC) of compatible, 24 VDC powered, polarized Audio/Visual appliances or audio speakers.
2. The Control Module shall mount in a standard 4-inch square, 2-1/8" deep electrical box or to a surface mounted backbox.
3. The NAC shall wire in a Class B (Style Y) or Class A (Style Z) fashion. Each control module shall support up to 1 Amp of Inductive or 2 Amps of Resistive Audible/Visual signals.
4. Audio/Visual power shall be provided by a separate supervised power Loop from the main Fire Alarm Control Panel or from a supervised, UL listed Remote Power Supply.
5. The Control Module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Control Module is operational and is in regular communication with the control panel.
6. A magnetic test switch shall be provided to test the module without opening or shorting its NAC circuit wiring.

M. Addressable Relay Module (Fire-Lite Alarms model CRF-300)
1. Addressable Relay Modules shall be provided to allow a compatible control panel to switch discrete contacts by code command.
2. The Relay Module shall mount in a standard 4-inch square, 2-1/8" deep electrical box or to a surface mounted backbox.

3. The Relay Module shall provide two isolated sets of Form-C contacts for fan shutdown and other auxiliary control functions.
4. The Relay Module contact ratings shall support up to 1 Amp/30 VDC of Inductive load or 2 Amps/30VDC (coded) of Resistive load (up to 3 Amps in non-coded applications). The relay coil shall be magnetically latched to reduce wiring connection requirements and to insure that 100% of all auxiliary relays or may be energized at the same time on the same pair of wires.
5. The Control Module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Control Module is operational and is in regular communication with the control panel.
6. A magnetic test switch shall be provided to test the module without opening or shorting its NAC circuit wiring.

N. Isolator Module (Fire-Lite Alarms model I300).
1. Isolator Modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The Isolator Module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the Isolator Module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the Isolator Module shall automatically reconnect the isolated section of the SLC loop.
3. The Isolator Module shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an Isolator Module after its normal operation.
4. The Isolator Module shall mount in a standard 4-inch deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the Isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

O. Waterflow Switches (System Sensor WFD Series)
1. Flow switches shall be integral, mechanical, non-coded, non-accumulative retard type.
2. Flow switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds.
3. Flow switches shall be located a minimum of one (1) foot from a fitting that changes the direction of the flow and a minimum of three (3) feet from a valve.

P. Sprinkler and Standpipe Valve Supervisory Switches:
1. Each sprinkler system water supply control valve riser or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. Each Post Indicator Valve (PIV) or main gate valve shall be equipped with a supervisory switch.
3. Mount switch so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve

control, or when the stem has moved no more than one-fifth of the distance from its normal position.

4. The mechanism shall be contained in a weatherproof aluminum housing, that shall provide a 3/4-inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. Switch housing to be finished in red baked enamel.
6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

Q. Serial, LED-Type, Remote Annunciation (Fire-Lite Alarms AFM Series)

1. The annunciator shall communicate with the fire alarm control panel via an EIA 485 (ACS mode) communications loop and shall annunciate all zones in the system. Up to 32 annunciators may be connected to the EIA 485 communications loop.
2. The annunciator shall need no more than four wires to connect to the FACP.
3. The annunciator shall provide a red Alarm LED per zone, and a yellow Trouble LED per zone. The annunciator will also have an "ON-LINE" LED, local piezo sounder, local acknowledge/lamp test switch, and custom zone/function identification labels.
4. The annunciator switches may be used for System control such as, Global Acknowledge, Global Signal Silence, and Global System Reset.

R. Serial, LCD-Type, Remote System Display (Fire-Lite Alarms LCD-80 Series)

1. The annunciator shall communicate with the fire alarm control panel via an EIA-485 (Terminal Mode) communications loop and shall include a 80-character, backlit, LCD display which mimics the integral fire alarm control panel LCD display. Up to 32 annunciators may be connected to the EIA-485 communications loop.
2. The annunciator shall require no more than four wires on the communication loop (two for communication, two for supervision) and two additional wires for power.
3. In addition to the LCD, English language display, the annunciator shall also include a Power LED, Alarm LED, Trouble LED and Supervisory LED.
4. A local piezo sounder shall also be included on the annunciator.
5. Switches for Acknowledge/Lamp Test, Silence, Drill and Reset shall be included on the annunciator protected from unauthorized usage by a key switch (keyed alike to the host FACP).

2.5 BATTERIES

A. Shall be 12 volt, Gell-Cell type (two required).

B. Batteries (two required) shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.

C. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

2.6 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
   1. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.
   2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
   3. Rating: 120-V ac, 24-V ac or dc.

2.7 INSPECTION BAR CODES

A. Inspection bar codes shall be installed on all initiating devices, annunciators, control panels and power supplies.

B. Inspection bar codes used by the system must utilize Code 3 of 9 or other approved format, and contain a minimum of eight (8) digits that comprise a unique serial identifier within the Web-based Reporting System. There shall be no duplication of serial numbers. Serial number shall be printed below the bar code for identification purposes.

C. Inspection bar codes shall be limited in size to no more than 2" (5cm) in width, and 3/8" (2 cm), in height and shall include a Mylar® or other protective coating to protect the bar code from fading due to sunlight or exposure.

D. Inspection bar codes shall be installed on each device in such a manner as to require that scanning of the bar code take place no further than 12" from the device during inspection.

2.8 WIRE AND CABLE

A. Signaling Line Circuits – Annunciator Data: Twisted pair, not less than No. 18Awg or as recommended by the manufacturer.

B. Signaling Line Circuits – Intelligent Loop: Twisted pair, not less than No. 18Awg or as recommended by the manufacturer.
   1. Circuit Integrity Cable: Provide as required to meet NFPA or Local Code requirements.
   2. CI Cable shall meet National Electrical Code, power limited fire alarm service.
   3. Existing wiring may be reused as long as it is in good shape, free of electrical noise, and meets the requirements of National Electrical Code and local AHJ.

C. Notification Appliance Circuits –
   1. Horn and Visual. 12AWG THHN or FPLP or as recommended by the manufacturer.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA72 for installation of fire-alarm equipment.

B. Equipment Mounting: Install fire-alarm control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.

C. Smoke- or Heat-Detector Spacing:
   1. Comply with NFPA72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
   2. Comply with NFPA72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
   3. Smooth ceiling spacing shall not exceed 30 feet.
   4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to NFPA 72.
   5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
   6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

D. Duct Smoke Detectors: Comply with NFPA72 and NFPA90A. Install sampling tubes so they extend the full width of duct.

E. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location with elevator contractor.

F. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.

G. Notification Appliance Devices: Install between 80 and 96 inches on the wall or ceiling mounted as noted on the drawings.

H. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches above the finished floor.

3.2 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 8 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
   1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
   1. Smoke dampers in air ducts of designated air-conditioning duct systems.
   2. Alarm-initiating connection to elevator recall system and components. Coordinate with elevator contractor and section 16723.
   3. Alarm-initiating connection to activate emergency lighting control.
   4. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
   5. Supervisory connections at valve supervisory switches.
   6. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
   7. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
   8. Supervisory connections at fire-pump engine control panel.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."

B. Install framed instructions in a location visible from fire-alarm control unit.

C. All initiating devices shall have bar code label installed visibly on the device. This bar code shall be used for digital inspection of the fire alarm system using Building Reports.Com.

3.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by Architect, Engineer and authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:
   1. Visual Inspection: Conduct visual inspection prior to testing.
      a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
      b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72; retain the "Initial/Reacceptance" column and list only the installed components.
   2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.
   3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
   4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
   5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
   6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72 and the

"Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

I. Annual Test and Inspection: During the warranty period, each year test fire-alarm system complying with visual and testing inspection requirements in NFPA72. Use forms developed for initial tests and inspections.

J. Detector Sensitivity Testing: During the warranty period, each year the contractor is to perform detector sensitivity testing and provide report to the Owner. Unless, the system is UL Listed to perform automatic sensitivity testing without any manual intervention and should detector fall outside of sensitivity window, the system will automatically indicated a devices trouble. A copy of UL letter is to be provided as proof of system operation

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system for a minimum of one working day.

END OF SECTION 16721

REPORT OF
GEOTECHNICAL INVESTIGATION

FIRE STATION
COUNTY LINE ROAD AND TROUT CREEK DRIVE

Hillsborough County, Florida

PREPARED FOR:

5M CIVIL, LLC

12315 Wycliff Pl
Tampa, Florida 33626

FES PROJECT NO.: 17-3420

July 13, 2017

PREPARED BY:

FAULKNER
ENGINEERING SERVICES, Inc.

2734 Causeway Center Drive
Tampa, Florida 33619

FAULKNER
ENGINEERING SERVICES, Inc.

GEOTECHNICAL ENGINEERING
& CONSTRUCTION
MATERIALS TESTING

July 13, 2017

Mr. Jesús Merly, P.E.
5M Civil, LLC
12315 Wycliff Pl
Tampa, Florida 33626

RE: Report of Geotechnical Investigation
Fire Station – County Line Road and Trout Creek Drive
Hillsborough County, Florida
FES Project No.: 17-3420

Dear Mr. Merly:

Faulkner Engineering Services, Inc. (FES) has completed a geotechnical investigation of the referenced project site. We provided our services in general accordance with our proposal number P17-5096 dated February 23, 2017. The purpose of our investigation was to explore the subsurface soil and groundwater conditions at the site to provide recommendations for foundation and pavement design. This report summarizes the field investigation performed by FES and presents our findings, conclusions and geotechnical engineering recommendations.

PROJECT INFORMATION

Existing Site

The project site is ±2.5 acres of vacant land located at 20770 Trout Creek Drive in Tampa, Hillsborough County, Florida within Section 1, Township 27 South and Range 19 East. Presently, the site is vacant and covered with high grass and small trees scattered at various locations. Topographically, the site is relatively level with minor elevation changes. The site is bordered by E County Line Road to the north, Trout Creek Drive to the east, and stormwater ponds to the west and south. A general site location map is included as **Figure 1**.

Proposed Construction

Based on our review of the Master Site Plan provided by 5M Civil. LLC, we understand the project will consist constructing an approximately 9,281 SF fire station building and an approximately 1,291 SF training room building with associated driveway/parking areas.

Structural loads were not provided. Based on other similar facilities, we assume maximum column loads of 50 kips, maximum wall loads of 3 to 5 kips per linear foot and maximum live loads on the slab-on-grade of 200 pounds per square foot. We have also assumed no special floor flatness or levelness criteria will be required.

Finished site grades have not been provided. We anticipate minor earthwork will be required with cut/fill depths of about 2 feet or less.

Soil Survey Review

Information from "Soil Survey of Hillsborough County, Florida", as prepared by the U.S. Department of Agriculture (USDA) - Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service) for the subject property was reviewed as part of the investigation. The USDA-NRCS soil map of the project area is shown in **Appendix A** along with soil unit legends. The subject property is primarily underlain by:

- *Myakka fine sand, 0 to 2 percent slopes (Map Unit Symbol 29)* – The NRCS defines this unit as nearly level, poorly drained and located on flatwoods on marine terraces. The NRCS indicates this soil unit typically has a surface layer of fine sand to a depth of 80 inches below ground surface (bgs). The NRCS indicates the SHGWT is approximately 6 to 18 inches (bgs).

The NRCS soil classifications are based on interpretation of a combination of factors including but not limited to aerial photographs and widely spaced hand-auger borings. Borders shown on the map included in **Appendix A**, between mapping units are approximate, and the transitions between soil units will be gradual. In addition to various minor inclusions within a mapped soil unit, areas of dissimilar soils can also occur. However, the soil survey provides a good basis for an initial evaluation of shallow soil conditions in the area, and can provide an indication of various historic activities such as development, mining and filling operations at the site.

SUBSURFACE INVESTIGATION

Field Investigation

During our field investigation, three (3) standard penetration test (SPT) soil borings were advanced to a depth of approximately 25 feet (bgs) within the proposed fire station and training room buildings (2 in the fire station building and 1 in the training room building) and four (4) mechanical auger borings were advanced to a depth of approximately 8 feet (bgs) within the planned roadway/parking areas. Fieldwork was performed on July 6, 2017, using a off-road vehicle mounted CME-550 drill rig, operated by J&R Precision Drilling, Inc. FES performed field sampling and testing in general accordance with ASTM procedures and established geotechnical engineering practice.

A senior engineering technician from FES, experienced in soil sampling and classifications, was onsite during the fieldwork to monitor the drilling and perform a brief cursory site reconnaissance, noting pertinent site and topographic features as well as surface indicators of soil conditions. SPT borings (B-1 to B-3) and the auger borings (AB-1 through AB-4) were field located by estimating distances from the apparent property boundaries. Boring locations are shown on the boring location plan (**Figure 2**) and should be considered approximate.

SPT borings were continuously sampled within the first 10 feet and samples were taken every 5 feet thereafter until reaching the termination depths of the borings. We employed wet rotary drilling techniques (with drilling mud) to keep the holes from collapsing due to groundwater intrusion. The drillers collected soil samples using a 1.4-inch I.D. split barrel sampler driven by an automatic hammer system with a 140-pound hammer falling a distance of 30 inches, in general accordance with standard penetration test procedures (ASTM D 1586). Upon completion, each borehole was backfilled to surface using soil cuttings and bentonite chips.

Auger borings were advanced by mechanically rotating an approximately 4-inch diameter flight auger into the subsurface soils. Cuttings brought to the surface were logged in the field and representative samples were obtained at each change in the soil stratigraphy. Upon completion, each borehole was backfilled with soil cuttings to the surface. Detailed descriptions of the soils encountered during the field exploration are presented on the Boring Logs and Profiles in **Appendix B**.

Soil Sample Handling and Classification

FES field personnel classified the soils obtained from the field sampling using standard visual-manual methods in accordance with ASTM D2488. Samples recovered from the SPT and auger borings were placed in sealed containers to retain moisture and transported to the FES soils laboratory accredited by Construction Materials Engineering Council, Inc. (CMEC) for further evaluation by staff geotechnical engineer.

FINDINGS

Subsurface Conditions

General Soil Profile

Subsurface stratigraphy at the project site is illustrated on the soil boring logs and profiles shown in **Appendix B**. The logs and profiles were developed using field exploratory data from the SPT and auger borings. The computer generated boring logs and profiles do not imply increased accuracy. Based on this data, three subsurface units, or strata, were identified at the site as described below.

Stratum 1	SAND, SAND with clay; loose to medium dense, fine-grained quartz, variably clayey
	USCS classification = SP, SP-SC
Stratum 2	CLAYEY SAND; loose to medium dense, fine- grained quartz, variably clayey
	USCS classification = SC
Stratum 3	CLAY; medium to stiff, variably sandy, with occasional phosphate
	USCS classification = CL

Stratum 1 occurred as the surficial stratum in each of the borings. This stratum extends to the termination of the auger borings at 8 feet (bgs) and to a maximum depth of about 13 ½ feet in the SPT borings. This soil unit consisted of sand and sand with clay. The SPT "N" values within this stratum ranged from 5 to 23 blows per foot indicating loose to medium dense relative density.

Stratum 2 occurred only in the SPT borings below Stratum 1 and extended to depths ranging from about 18 feet to 23 feet (bgs). This soil unit consisted of variably clayey. The SPT "N" values within this stratum ranged from 6 to 22 blows per foot, indicating loose to medium-dense relative density.

Stratum 3 occurred only in the SPT borings below Stratum 2 and extended to the termination of the borings at 25 feet (bgs). This stratum consisted of variably sandy clay with SPT "N" values ranging from 7 to 12 blows per foot indicating medium to stiff consistency.

The conditions presented above highlight the major subsurface stratifications encountered during our field investigation of the site. More detailed descriptions of the materials encountered are provided in **Appendix B**. A soil classification key sheet is included as **Appendix C**. Subsurface conditions will vary across this site and between boring locations. Changes in subsurface strata may be more gradual than indicated on the logs and profiles.

Groundwater

Groundwater was encountered in the SPT and auger borings at depths ranging from approximately 5.3 to 6.5 feet (bgs) at the time of drilling. Groundwater levels will fluctuate with time due to seasonal rainfall and locally heavy precipitation events; therefore, future groundwater levels may be encountered at depths different from those indicated by our borings. The groundwater levels at the time of drilling for each boring location are listed on the attached Groundwater Data Table (**Table 1**).

The SHGWT is typically encountered during late summer following the rainy season. Several factors can affect the seasonal high groundwater level such as drainage characteristics of the soils; land surface elevation; and relief points such as lakes, rivers and swamps. Based on our experience, evaluation of existing groundwater levels, the soil indicators (where present), and review of the soil survey for Hillsborough County, we estimate the SHGWT at this site ranges from approximately 2.5 to 3.0 feet (bgs) (**Table 1**).

CONCLUSIONS

Our geotechnical engineering evaluation of this site and our recommendations with respect to the proposed building construction are based on our site observations, the field and laboratory data obtained from our borings, and our professional judgment. It is our opinion that with proper site preparation in accordance with procedures presented in the **Recommendations** section of this report, the soils encountered should adequately support the planned buildings on a shallow foundation system.

Based on the SPT blow counts recorded during our field investigation within the areas of the planned buildings, the soils are generally loose to medium-dense within the upper 10 feet with penetration resistances (N values) ranging from 5 to 23 blows per foot. Below the upper 10 feet to the termination of the borings, the soils are generally loose/medium to medium-dense/stiff with penetration resistances ranging from 6 to 22 blows per foot. In-place densification of the surface and near surface soils using a heavy vibratory roller compactor will be required subsequent to clearing and stripping operations and prior to the placement of fill soil or beginning construction. Recommendations pertaining to in-place densification, structural fill suitability, placement, and compaction are presented in the **Recommendations** section below.

The auger borings performed within the planned roadway/parking areas encountered fine sand (SP) and fine sand with clay SP-SC) from the ground surface to the termination of the borings at 8 feet (bgs). It appears that the shallow subsurface soils will provide a suitable subgrade for pavements after proper site preparation and in-place densification described in the **Recommendations** section of this report. In addition, the Stratum 1 soils encountered in the auger borings, after drying back to their optimum water content (ASTM D1557), can be re-used as backfill material during utility installations.

Groundwater was encountered in our soil borings at depths ranging from 5.3 to 6.5 feet (bgs). We recommend maintaining a minimum of 1 foot of separation between the estimated SHGWT (discussed in the groundwater section above) and the bottom of the lowest footings. A minimum 2-foot separation between the bottom of the base course and the SHGWT should be maintained for the flexible pavement when limerock base course is used. However, if a moisture tolerant base course such as soil cement or crushed concrete is used in conjunction with underdrains, the separation between the bottom of the base course and the SHGWT can be reduced to 1 foot. Separation between the bottom of the concrete pavements and SHGWT should be at least 12 inches.

Use of Information

It should be noted that subsurface conditions can vary across this site and between boring locations. Conditions can also vary in areas not explored by our borings. Contractors bidding earthwork are urged to conduct their own borings, test pits or other investigations to determine those conditions that may affect their specific work requirements. FES cannot be responsible for interpretations made by others based on the information contained in this report and the attachments.

RECOMMENDATIONS

Site Preparation

Site Stripping / Undercutting

Before earthwork and construction activities begin, existing topsoil, vegetation, surface debris, large roots down to finger-size, and any other deleterious material should be removed from within the construction limits. Site stripping should extend at least 10 feet beyond the construction area.

Any pockets of organics, organic-laden soils and/or deleterious material should be undercut to competent soil. The resulting excavations should be backfilled with structural fill placed in maximum one-foot thick lifts. Backfill soils should be of the same composition and compacted to the same criteria as structural fill soils. This process should be observed by a representative of FES to check that organics, organic-laden soils and/or deleterious material has been removed.

Proof-Rolling / In-Place Densification

Following site stripping and prior to any fill placement or beginning construction, proof-rolling / in-place densification of the ground surface should be performed within the construction area using a heavy vibratory roller. Based on experience, vibratory rollers should be operated in the static mode within 100 feet of existing structures to avoid transmission of vibrations that could cause structural distress. Compaction within the construction area should continue until the soils appear relatively firm and unyielding and the soils have achieved a relative compaction of at least 95 percent of modified Proctor maximum dry density (ASTM D1557) to a depth of at least 2 feet below the exposed ground surface subsequent to stripping and undercutting. The exposed ground may need to be moisture conditioned or dried to bring its moisture content to within 2 percent of the optimum moisture content (ASTM D1557). The subgrade soils below the pavement area should be compacted to at least 98 percent within the upper 2 feet.

Proof-rolling and densification efforts should be closely monitored by an FES engineering technician to observe any unusual or excessive deflection of the soils beneath the compacting equipment used. If unusual or excessive deflection is observed, then the areas should be undercut to firm soil and backfilled with compacted structural fill placed in maximum one-foot thick loose lifts.

Borrow Areas

Structural Fill Suitability

Definition

The preferred soil for use as structural fill and backfill is clean or relatively clean fine sand containing less than 12 percent material by weight finer than a number 200 sieve (material conforming to SP, SP-SM or SP-SC in the Unified Soil Classification System).

Excavated material containing up to 35 percent fines (materials conforming to SC or SM in the Unified Soil Classification System) may also be utilized as structural fill, provided the soil's plasticity index is less than 10 and the working subgrade is above the existing groundwater level. Clays should not be used as structural fill.

Any muck or organic soil, if encountered on site, will not be suitable for fill and should be disposed of offsite or placed in landscape areas and used for planting purposes. In addition, soils with an organic content, as determined by ASTM D2974, of more than 5 percent should not be used as structural fill. Because of the variability of the subsurface soils encountered, additional laboratory testing should be performed on the excavated material during grading and earthwork activities to evaluate its suitability for use as fill material.

Placement

Structural fill with less than 12 percent fines should be placed in lifts not to exceed one foot thick. Materials with a fines content greater than 12 percent should be placed in maximum 6-inch loose lifts.

Fill material should be compacted to at least 95 percent of its modified Proctor maximum dry density (ASTM D1557) and the water content shall be maintained within 2 percent of the optimum water content (ASTM D1557) during placement. The upper 2 feet below the pavement should be compacted to 98 percent of the modified Proctor maximum dry density at a water content within 2 percent of the optimum water content (ASTM D1557). Confined areas, such as utility trenches, should be compacted with manually operated portable vibratory compaction equipment.

Field density testing should be performed to check compaction for each lift of structural fill placed for each 2,000 ft^2 of area below structures and for each 5,000 ft^2 below pavements. In pavement areas, the subbase and base materials should be tested to the same frequency. Density tests should be performed for each lift of structural fill for every 100 linear feet of backfill placed in utility excavations or other excavations that are within the paving areas.

Depending on the time of year construction occurs, materials excavated containing clay fines may exist in a saturated condition. These soils will require processing and drying to achieve a water content to allow placement and proper compaction. Spreading the clayey material in thin lifts (loose thickness of 6 inches) and aerating by disking can facilitate and hasten the drying process. Disking will also be useful to breakdown larger clods of clayey soils. Specialty equipment typically associated with clayey soils such as a sheep's foot roller will also be required to achieve proper compaction.

The placement and compaction of moisture-sensitive soils of this type will require time and effort beyond that typically associated with sandy soil. A grading contractor experienced with placing and compaction of clay soils can likely reduce costly project delays due to soil conditions.

Foundation Recommendations

Based on the subsurface data obtained from our exploratory borings, the proposed buildings can be supported on a shallow foundation system provided the recommendations contained in this report are closely adhered to and proper densification of the site bearing soils occurs.

Column footings and continuous strip footings can be designed using a net allowable soil bearing pressure of 2,500 psf assuming a footing embedment of at least 18 inches below lowest exterior adjacent grades. If the actual column/wall loads result in a footing/soil contact pressure that exceeds the above allowable bearing pressure, the footings should be constructed wider or the footing embedment below lowest adjacent exterior grade increased, as recommended by our geotechnical engineer.

Even though computed footing dimensions may be less, column and wall footings should have a minimum width of at least 4 feet and 2 feet, respectively to avoid excessive settlements and punching shear failures. Based on the above recommendations for the footing size and embedment depths, the expected total settlements are less than 1 inch and the expected differential settlements are about 0.5 to 0.75 inches within a span of 30 feet.

Because of possible disturbance from excavation, the soils exposed at the bottom of the foundation excavations should be re-compacted to at least 95 percent of the soils modified Proctor maximum dry density (ASTM D1557) prior to the placement of reinforcing steel and concrete. Compaction should be checked prior to the placement of reinforcing steel.

Floor Slab Recommendations

We have assumed that no unusual live loads will be applied to the floor slabs due to vibration, impact or high intensity contact pressures. A modulus of subgrade reaction of 200 pounds per cubic inch may be used for floor slab design purposes if the slab is placed on structural fill or in-situ soils that have been prepared and densified in accordance with the recommendations presented in this report. This modulus of subgrade reaction assumes the soil beneath the slab will achieve a Limerock Bearing Ratio (LBR) value of at least 15. The subgrade should be covered with an effective vapor retarder to reduce the possibility of slab dampness.

Flexible Pavement Recommendations

The following minimum pavement sections are provided for consideration for the parking areas at this development. However, the project civil engineer should develop the actual minimum pavement thickness based on anticipated traffic loads and other considerations in accordance with FDOT and Hillsborough County standards.

Section Description	Light Duty (inches)	Heavy Duty (inches)
Surface Course Type SP-9.5 or SP-12.5 Asphalt (Section 334, FDOT) compacted to at least 95 percent of the maximum laboratory Marshall density.	1.5	2
Base Course Limerock (Section 911, FDOT) having a minimum LBR of 100 and compacted to at least 98 percent of its modified Proctor maximum dry density at a water content within 2 percent of the optimum value (ASTM D1557). **If the bottom of the base is within 2 feet of the SHGWT, then a moisture tolerant base will be required such as soil cement or crushed concrete or shell-rock (Section 913A, FDOT).**	6	8
Subbase A minimum LBR of 40 and compacted to at least 98 percent of the modified Proctor maximum dry density at a water content within 2 percent of the optimum value (ASTM D1557).	12	12

If the SHGWT is within 3 feet of the low edge of the pavement, an underdrain is required on one side of the road; if the SHGWT is within 2 feet of the low edge of pavement, underdrains are required on both sides of the road; if SHGWT is less than 1 foot below the low edge of pavement, the roadway should be elevated by adding compacted structural fill. In addition, if soil-cement or crushed concrete base is used in conjunction with underdrains to reduce the base clearance requirement, a minimum of 6 inches of select sand (S) or special select sand (S+) (FDOT Index 505) should be placed under the base course to provide positive drainage. If asphalt base is used the 6-inch select sand layer is not necessary.

Methods and materials used for pavement construction should conform to applicable sections of the most recent edition of the FDOT Standard Specifications for Road and Bridge Construction. We further recommend that LBR testing be performed on the subgrade/subbase soils to establish an LBR value to determine the level of stabilization required, if any.

Subgrade soils should be compacted as recommended above and free of ruts or disturbances caused by construction vehicles after compaction has been achieved.

Rigid Pavement

Rigid pavements need a minimum of 12 inches of separation between the bottom of the surface course and the SHGWT. The following rigid pavement section is recommended for the proposed pavement areas at the project site.

Section Description	Thickness (inches)
Surface Course Reinforced Portland Cement Concrete with 4000 psi, 28-day compressive strength.	6
Stabilized Subgrade A minimum LBR of 40 and compacted to at least 98 percent of the modified Proctor maximum dry density (ASTM D1557).	12

Subgrade soils should be compacted as recommended above and free of ruts or disturbances caused by construction vehicles after compaction has been achieved.

Materials used for construction of the rigid pavement should meet applicable Florida Department of Transportation (FDOT) specifications for roadway construction materials as outlined in the FDOT Standard Specifications for Road and Bridge Construction. Installation procedures should also be in compliance with this publication.

TESTING AND MONITORING

Construction testing and monitoring are essential to proper site construction and performance. Observation and testing of site preparation and earthwork activities is an integral part of the engineering recommendations contained in this report. Having FES provide the construction materials testing and inspection services provides continuity and increases the potential that our recommendations will be properly implemented.

LIMITATIONS

This report has been prepared for the exclusive use of **5M Civil, LLC** for the specific application to the project previously discussed. Our conclusions and recommendations have been rendered using generally accepted standards of geotechnical engineering and geology practice in the state of Florida. No other warranty is expressed or implied.

Our conclusions and recommendations are based on the design information furnished to us, the data obtained from the previously described subsurface exploration, and our experience. They do not reflect variations in the subsurface conditions that are likely to exist in the region of our borings and in unexplored areas of the site. These variations are due to the inherent variability of the subsurface conditions in this geologic region. Should variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon our on-site observations of the conditions.

Florida is underlain by limestone bedrock that is susceptible to dissolution and the subsequent development of karst features such as voids and sinkholes in the natural soil overburden. Construction in a sinkhole prone area is therefore accompanied by some risk that internal soil erosion and ground subsidence could affect new structures in the future. It is not possible to investigate or design to completely eliminate the possibility of future sinkhole related problems. In any event, the Owner must understand and accept this risk.

The scope of our services does not include any environmental assessments or investigations for the possible presence of hazardous or toxic materials in the soil, groundwater or surface water within or in the general vicinity of the site studied. Any statements made in this report or shown on the test boring logs regarding unusual subsurface conditions and/or composition, odor, staining, origin or other characteristics of the surface and/or subsurface materials are strictly for the information of our client and may or may not be indicative of an environmental problem.

If changes are made in the overall design or the location of the proposed buildings or roadway/parking areas or if the expected building loads differ from the loads we assumed, the recommendations presented in this report must not be considered valid unless the changes are reviewed by our firm and recommendations modified or verified in writing. We should be given the opportunity to review the grading plan and the applicable portions of the project specifications when the design is finalized. This review will allow us to check whether these documents are consistent with the intent of our recommendations.

CLOSING

Faulkner Engineering Services, Inc. appreciates the opportunity to be of service to **5M Civil, LLC** by providing these geotechnical consulting services and we look forward to assisting you through project completion. If you have any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Faulkner Engineering Services, Inc.

Pavan K. Kolukula, E.I.
Senior Geotechnical Engineer

7/13/17

David W. Faulkner, P.E.
President
Florida License No. 50740

DAVID W. FAULKNER LICENSE No 50740 STATE OF FLORIDA PROFESSIONAL ENGINEER

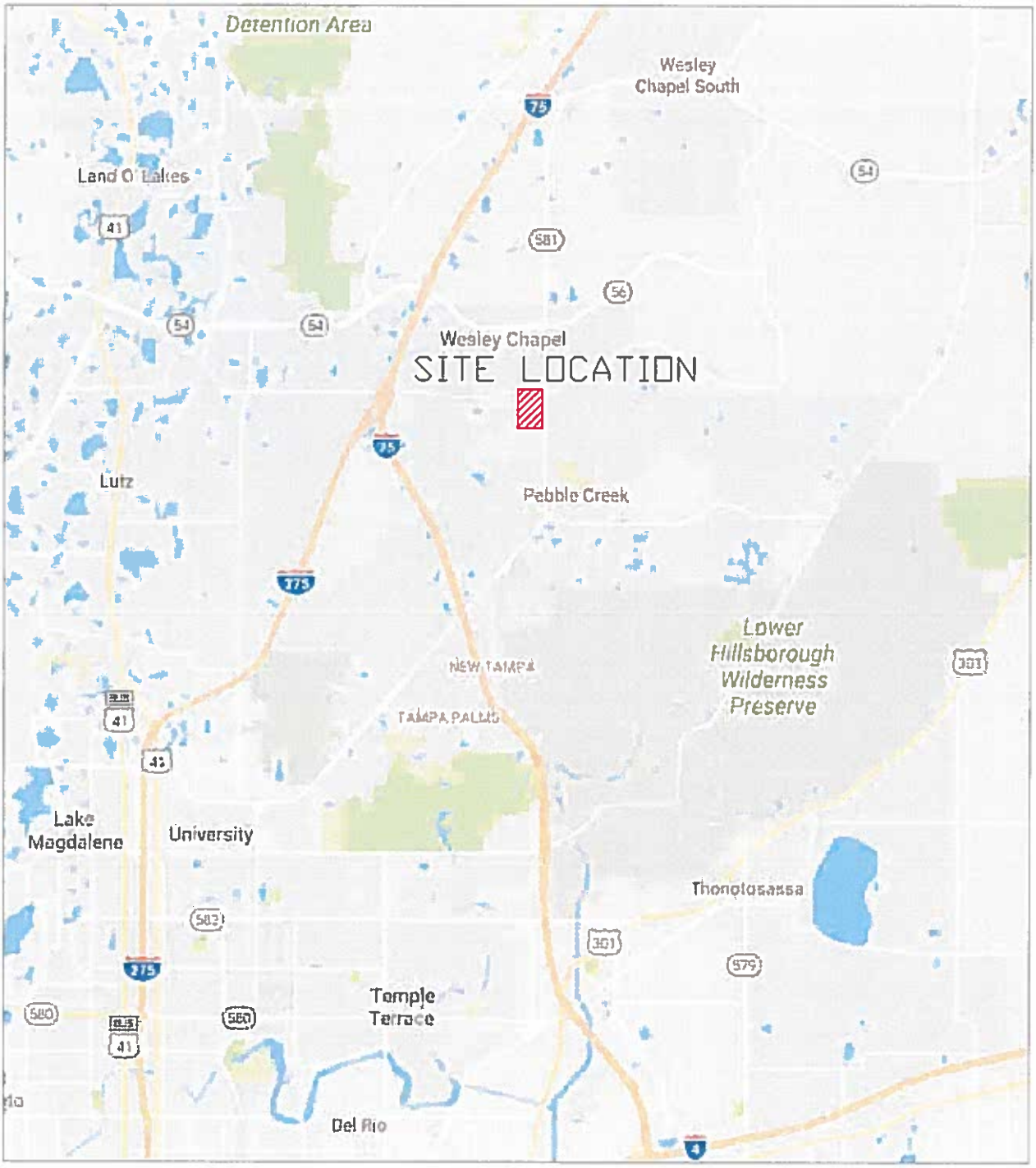
Copy to: Client (2)
James Jackson (City of Tampa)

Attachments: Figure 1: Site Location Map
Figure 2: Boring Location Plan

Table 1: Groundwater Data

Appendix A: Soil Survey Map
Appendix B: Logs and Profiles of Soil Borings
Appendix C: Key to Soil Classification

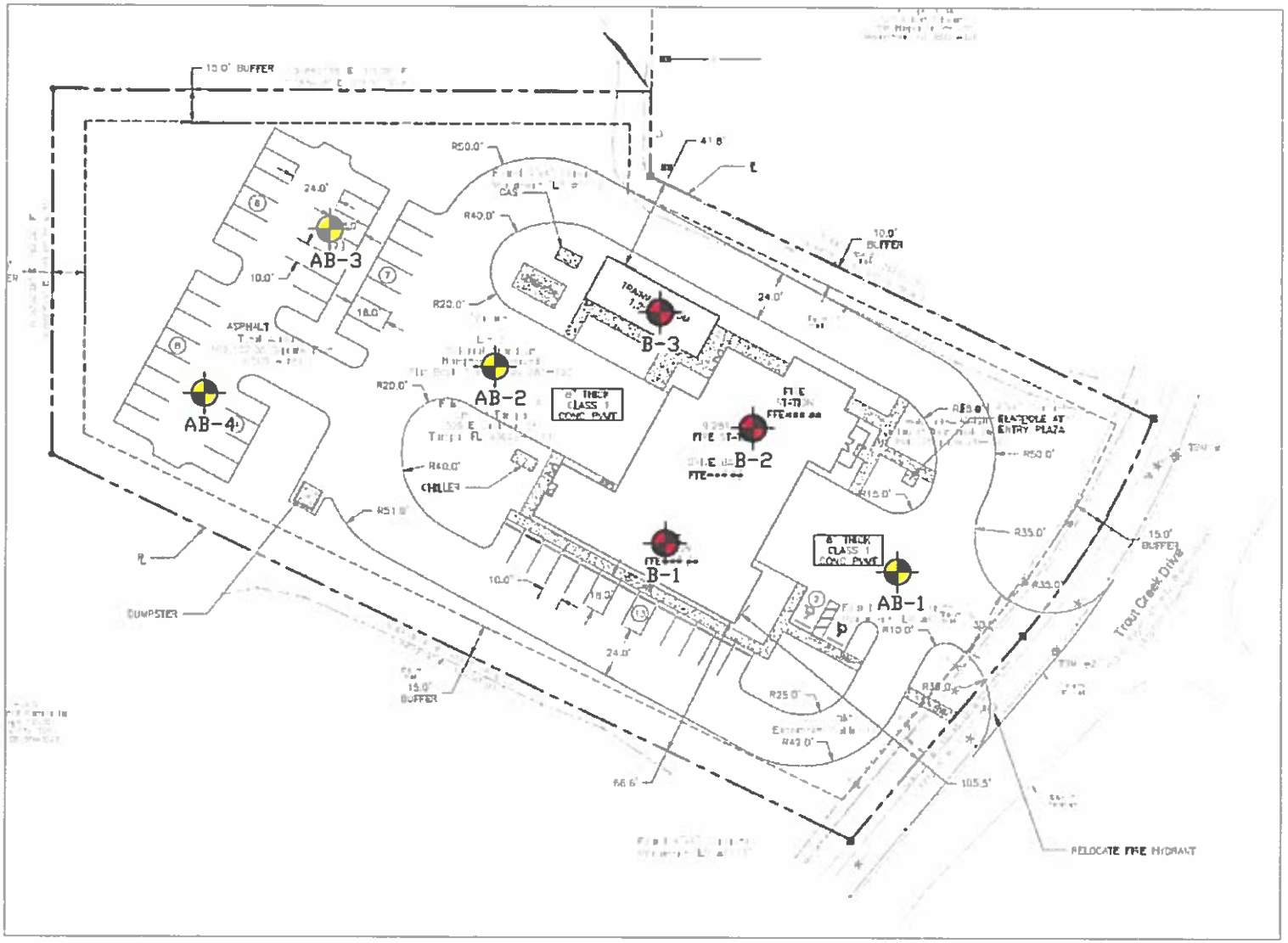
SITE LOCATION MAP



FAULKNER ENGINEERING SERVICES, Inc.	Fire Station - County Line Road and Trout Creek Drive	N.T.S.	DATE 07.13.17 / JOB NO. 17-3420
Geotechnical Engineers Construction Material Testing		DRAWN: PK / CHKD: DF	FIGURE 1

2714 Causeway Center Dr
Tampa, Florida 33619
PHONE: 813 621 8168
FAX 813 621 8232
www.faulknereng.com

BORING LOCATION PLAN



LEGEND

B-1 — SPT BORING

AB-1 — AUGER BORING

Note:
Basemap by 5M Civil, LLC

FAULKNER ENGINEERING SERVICES, Inc.

Geotechnical Engineers
Construction Material Testing

2734 Causeway Center Dr
Tampa, Florida 33619
PHONE 813.621.8168
FAX 813.621.8232
www.faulknereng.com

Fire Station - County Line Road and Trout Creek Drive	NOTES:	N.T.S.	DATE 07.13.17 / JOB NO. 17-3420
		DRAWN: PK / CHKD: DF	FIGURE 2

Table 1 - Groundwater Data

Boring	Ground Elevation	Existing Groundwater Table	Estimated SHGWT[3] from NRCS Soil Survey	Estimated SHGWT[3] from Field Exploration
	(feet, NAVD 1988)[1]	(feet, bgs)[2]	(feet, bgs)[2]	(feet, bgs)[2]
B-1	-	6.3	0.5 - 1.5	3.0
B-2	-	6.3	0.5 - 1.5	3.0
B-3	-	5.3	0.5 - 1.5	2.5
AB-1	-	6.5	0.5 - 1.5	3.0
AB-2	-	6.5	0.5 - 1.5	3.0
AB-3	-	6.5	0.5 - 1.5	3.0
AB-4	-	6.5	0.5 - 1.5	3.0

[1] - North American Vertical Datum, ground elevations not available at time of drilling

[2] - Below Ground Surface

[3] - Seasonal High Groundwater Table

NE - Not encountered

APPENDIX A

Soil Survey Map

Soil Map—Hillsborough County, Florida
(Fire Station 23)

Map Scale: 1:1,250 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hillsborough County, Florida
Survey Area Data: Version 15, Sep 16, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2015—Mar 28, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Hillsborough County, Florida (FL057)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
29	Myakka fine sand, 0 to 2 percent slopes	7.8	100.0%
Totals for Area of Interest		**7.8**	**100.0%**

APPENDIX B

Logs and Profiles of Soil Borings

FAULKNER ENGINEERING SERVICES, Inc.

DRILL HOLE LOG
BORING NO.: B-1

Project No.: 17-3420
Date: 7/6/2017

Project: Fire Station-County Line Road and Trout Creek Drive
Client: 5M Civil, LLC
Location: Hillsborough County, Florida
Driller: J & R Precision Drilling
Drill Rig: C ME-550
Depth to Water> **Initial** ▽ :

Elevation: N/A
Logged By: BB
At Completion ▼ : 6.3'

Depth/ Elevation	Soil Symbols	USCS	Description	Sample Type	Sample No.	Standard Penetration Test Blows	N	Penetration Resistance (10 20 30 40 60 80)
0		SP-SC	Loose, brown, fine SAND with clay		1	2 3 3	6	
					2	4 5 5	10	
5		SP	Medium-Dense, light brown, fine SAND		3	6 6 9	15	
					4	8 10 5	15	
					5	4 6 8	14	
10								
15		SC	Medium-Dense, gray, clayey SAND		6	7 8 10	18	
			Loose		7	4 3 3	6	
20								
25		CL	Medium, bluish gray CLAY		8	3 4 4	8	
			End of Boring					
30								
35								

This information pertains only to this boring and should not be interpreted as being indicative of the site.

FAULKNER ENGINEERING SERVICES, Inc.

DRILL HOLE LOG
BORING NO.: B-2

Project No.: 17-3420
Date: 7/6/2017

Project: Fire Station-County Line Road and Trout Creek Drive
Client: 5M Civil, LLC
Location: Hillsborough County, Florida
Driller: J & R Precision Drilling
Drill Rig: C ME-550
Depth to Water> **Initial** ▽ :

Elevation: N/A
Logged By: BB
At Completion ▽ : 6.3'

Depth/ Elevation	Soil Symbols	USCS	Description	Sample Type	Sample No.	Blows	N	Standard Penetration Test: Penetration Resistance (10 20 30 40 60 80)
0		SP-SC	Loose, brown, fine SAND with clay		1	2 2 3	5	
					2	3 4 4	8	
5		SP	Medium-Dense, light brown, fine SAND		3	6 8 8	16	
					4	6 10 13	23	
					5	8 6 6	12	
10								
		SC	Medium-Dense, light gray, clayey SAND		6	6 8 7	15	
15								
		CL	Medium, light gray CLAY		7	3 4 4	8	
20								
			Light, bluish gray with phosphate		8	3 4 3	7	
25			End of Boring					
30								
35								

This information pertains only to this boring and should not be interpreted as being indicative of the site.

FAULKNER ENGINEERING SERVICES, Inc.

DRILL HOLE LOG
BORING NO.: B-3

Project No.: 17-3420
Date: 7/6/2017

Project: Fire Station-County Line Road and Trout Creek Drive
Client: 5M Civil, LLC
Location: Hillsborough County, Florida
Driller: J & R Precision Drilling
Drill Rig: C ME-550
Depth to Water> **Initial** ▽ :

Elevation: N/A
Logged By: BB
At Completion ▽ : 5.3'

Depth/ Elevation	Soil Symbols	USCS	Description	Sample Type	Sample No.	Blows	N	Standard Penetration Test: Penetration Resistance (10 20 30 40 60 80)
0		SP-SC	Loose, brown, fine SAND with clay		1	1 3 3	6	
					2	3 4 4	8	
5		SP	Medium-Dense, brown, fine SAND		3	6 6 8	14	
			Light brown		4	8 8 12	20	
		SP-SC	Medium-Dense, light brown, fine SAND with clay		5	6 8 5	13	
10								
		SC	Medium-Dense, gray, clayey SAND		6	8 10 12	22	
15								
		CL	Medium, light bluish gray CLAY with phosphate		7	5 4 4	8	
20								
			Stiff		8	3 4 8	12	
25			End of Boring					
30								
35								

This information pertains only to this boring and should not be interpreted as being indicative of the site.

KEY TO SYMBOLS

Symbol Description

Strata symbols

Poorly graded sand with clay

Poorly graded sand

Clayey sand

Low plasticity clay

Misc. Symbols

Water table at boring completion

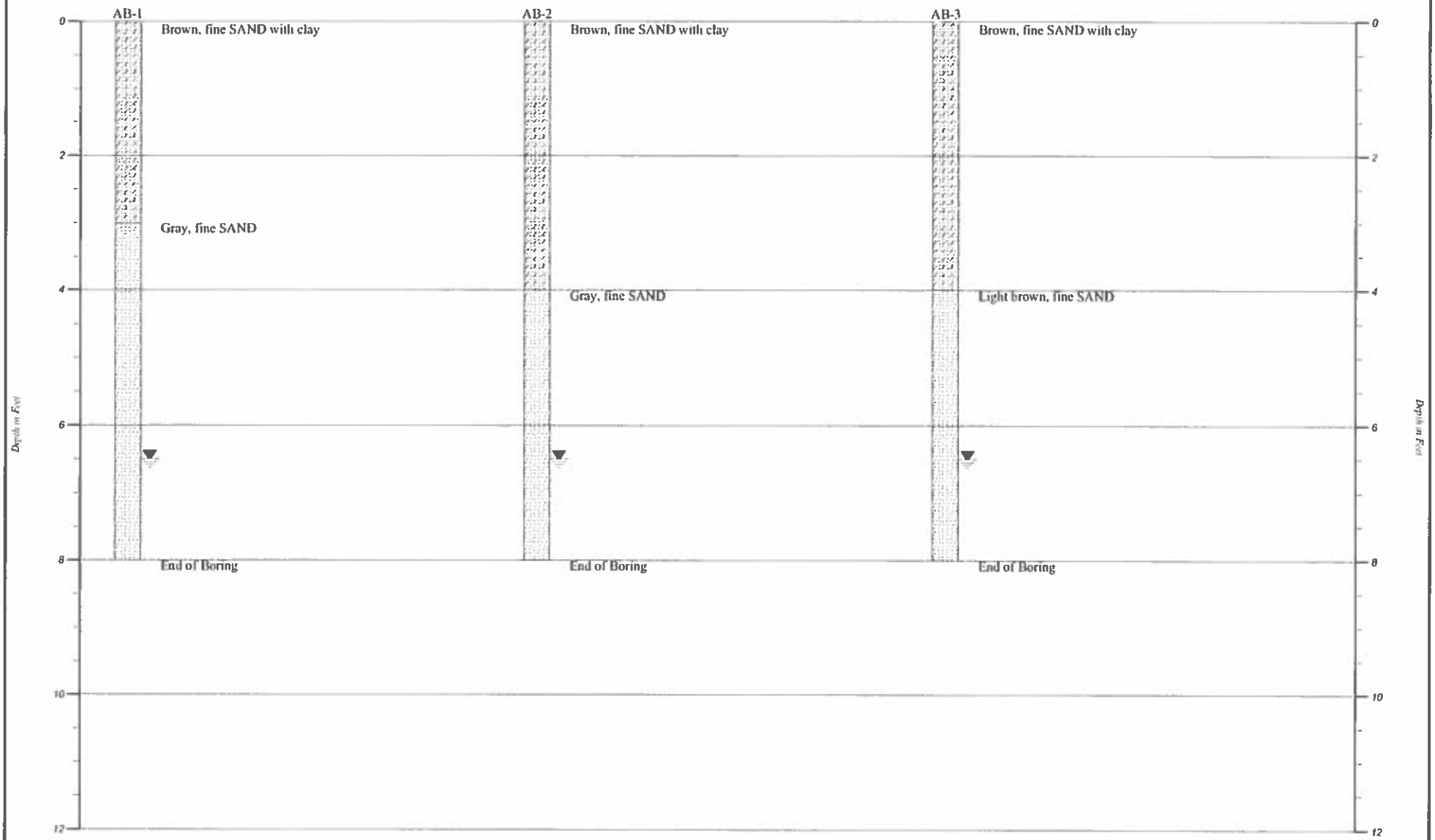
Soil Samplers

Standard penetration test

Notes:

1. Exploratory boring were performed using a 2-inch diameter split barrel sampler driven by a 140 lbs hammer (In accordance with ASTM D1586)

2. These logs are subject to the limitations, conclusions, and recommendations in this report.

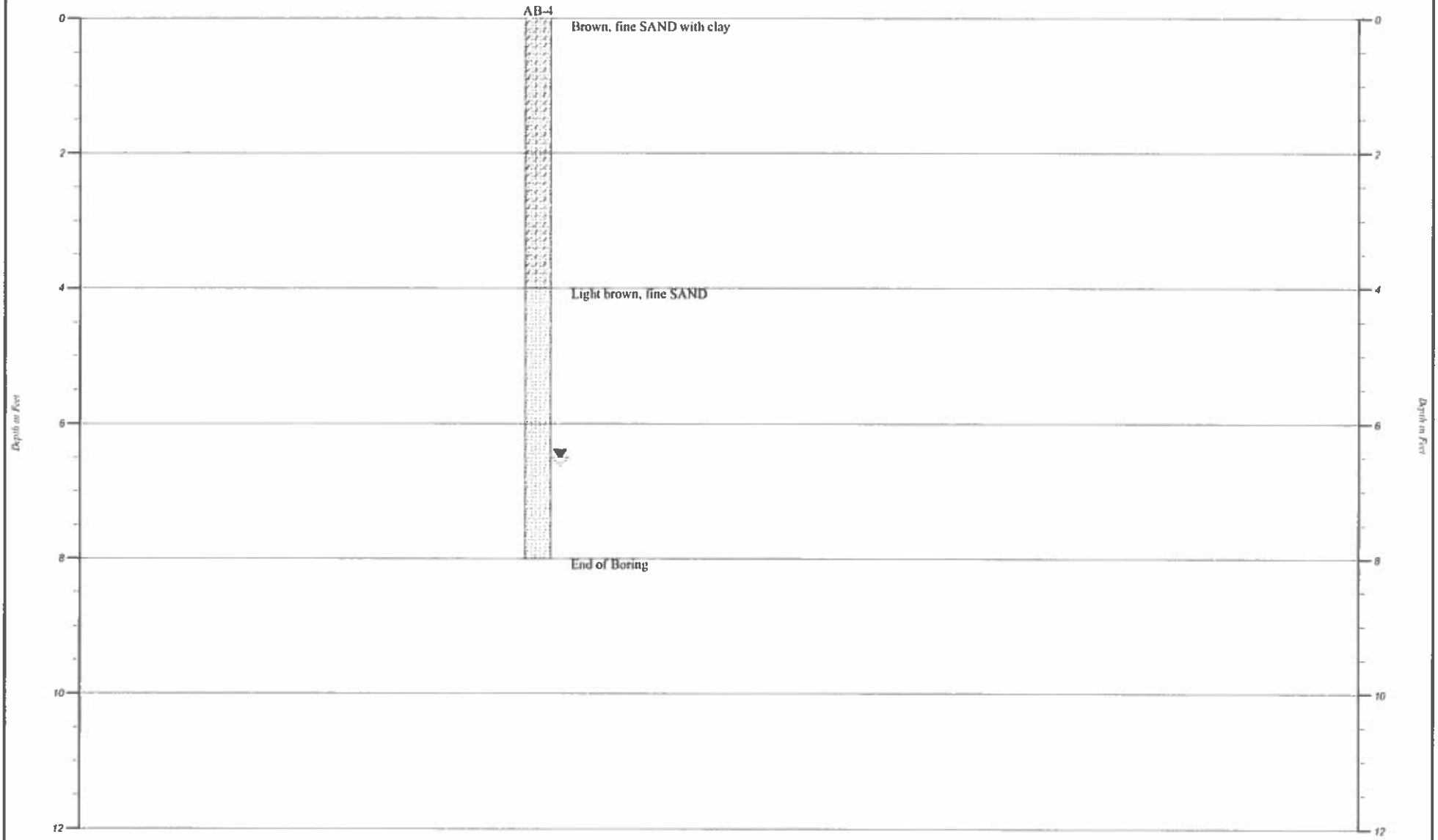


Plan View

Strata symbols

- Poorly graded sand with clay
- Poorly graded sand

Faulkner Engineering Services, Inc. GENERALIZED SOIL PROFILE		
HORIZONTAL SCALE: VERTICAL SCALE: 1"=2'	DRAWN BY/APPROVED BY PK/DF	DATE PERFORMED 7/6/2017
Fire Station-County Line Road and Trout Creek Drive		
PROJECT NO. 17-3420		



Plan View

Strata symbols

- Poorly graded sand with clay
- Poorly graded sand

Faulkner Engineering Services, Inc.

GENERALIZED SOIL PROFILE

HORIZONTAL SCALE:	DRAWN BY/APPROVED BY	DATE PERFORMED
VERTICAL SCALE: 1"=2'	PK/DF	7/6/2017

Fire Station-County Line Road and Trout Creek Drive

PROJECT NO. 17-3420

APPENDIX C

Key to Soil Classification

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

Major Division		Group Symbol	Laboratory Classification Data		Soil Description
			Finer than No. 200 Sieve %	Supplementary Requirements	
Coarse-Grained (Over 50% by Weight Coarser than No. 200 Sieve)	Gravelly Soils (Over Half of Coarse Fraction Larger than No. 4 Sieve)	GW	0 - 5*	$C_u \geq 4$ and $1 \leq C_c \leq 3$	Well-Graded Gravels, Sandy Gravels
		GP	0 - 5*	$C_u < 4$ and / or $1 > C_c > 3$	Gap-Graded or Uniform Gravels, Sandy Gravels
		GM	12 or More*	PI < 4 or Below A-Line	Silty Gravels, Silty Sandy Gravels
		GC	12 of More*	PI ≥ 7 and On or Above A-Line	Clayey Gravels, Clayey Sandy Gravels
	Sandy Soils (Over Half of Coarse Fraction Larger than No. 4 Sieve)	SW	0 - 5*	$C_u \geq 6$ and $1 \leq C_c \leq 3$	Well-Graded Sands, Gravelly Sands
		SP	0 - 5*	$C_u < 6$ and / or $1 > C_c > 3$	Gap-Graded or Uniform Sands, Gravelly Sands
		SM	12 or More*	PI < 4 or Below A-Line	Silty Sands, Silty Gravelly Sands
		SC	12 of More*	PI ≥ 7 and On or Above A-Line	Clayey Sands, Clayey Gravelly Sands
Fine-Grained (Over 50% by Weight Finer than No. 200 Sieve)	LOW Compressibility (Liquid Limit Less Than 50)	ML	Plasticity Chart		Silts, Very Fine Sands, Silty or Clayey Fine Sands, Micaceous Silts
		CL	Plasticity Chart		Low Plasticity Clays, Sandy or Silty Clays
		OL	Plasticity Chart, Organic Odor or Color		Organic Silts and Clays of Low Plasticity
	HIGH Compressibility (Liquid Limit Greater Than 50)	MH	Plasticity Chart		Micaceous Silts, Diatomaceous Silts, Volcanic Ash
		CH	Plasticity Chart		Highly Plastic Clays and Sandy Clays
		OH	Plasticity Chart, Organic Odor or Color		Organic Silts and Clays of High Plasticity
Soils with Fibrous Organic Matter		PT	Fibrous Organic Matter, Will Char, Burn, or Glow		Peat, Sandy Peats, and Clayey Peat

*For Soils having 5 to 12 percent passing the No. 200 Sieve, use a dual symbol such as GW-GC.